Maintenance Manual
AL120-12 Series

300mm   Semiconductor Wafer Loader

Wafer Loader
AL120-LMB12-LP3
AL120-LMB12-F
Wafer Loader Accessory
AL120-VS12
AL120-RC

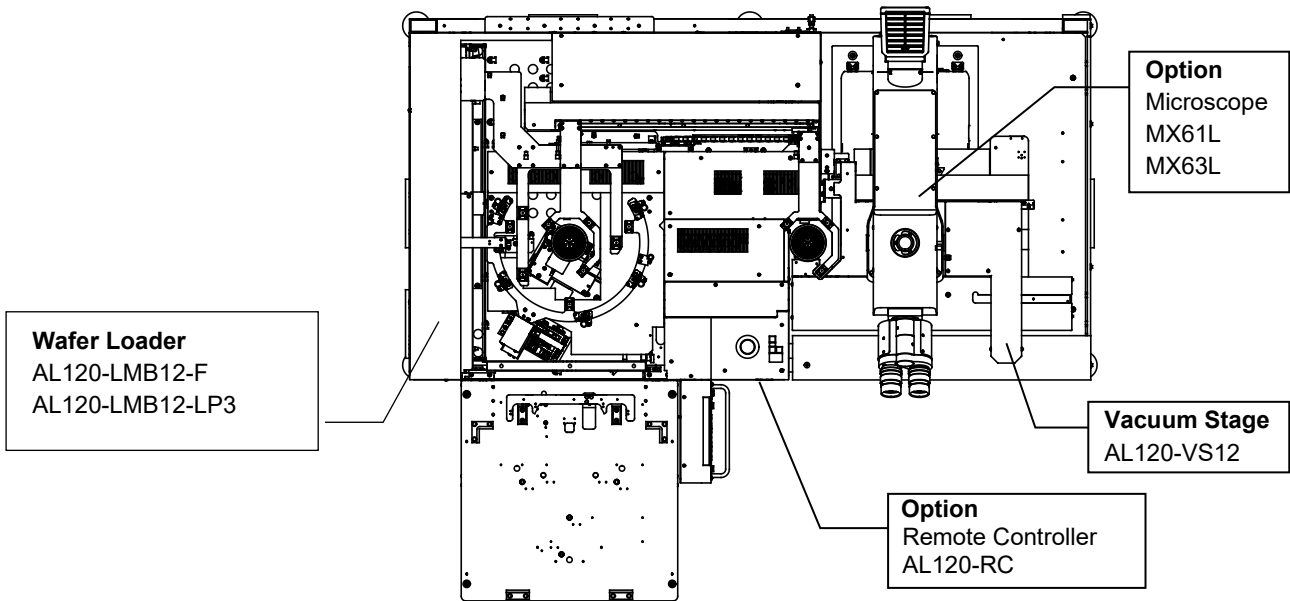Thank you for purchasing the EVIDENT AL120 Series Wafer Loader.
In order to fully utilize its performance and secure safety, please read this manual before operation.
Please also keep it at hand during operation as well as for future reference.
This manual is exclusively for maintenance service engineer.
Please also keep it at hand during operation as well as for future reference.

AM5060−02

i Introduction

Option
Microscope
MX61L
MX63L

Wafer Loader
AL120-LMB12-F
AL120-LMB12-LP3

Vacuum Stage
AL120-VS12

Option
Remote Controller
AL120-RC

AL120 Series Lineup

This product is an auto loader to transfer the wafer from the cassette to the microscope. The macro observation is available while transferring wafers.

AL120 series products consist of a model name and an applicable wafer size.

Note that only the AL120 series products with the same wafer size can be combined.

(The remote controller is common to all the AL120 series products.)

AL120 series

Series name	Model name	Wafer size	Cassette type
AL120-	**LMB**	**12**	**-LP3**

LMB：Type of Wafer Loader

-F　：FOSB specification
-LP3：FOUP opener specification

Stage

Series name	Model name	Wafer size
AL120-	**VS**	**12**

The AL120 series consists of a wafer loader, a vacuum stage, and other products.

This manual does not cover custom-order specifications or microscopes.

To acquire a comprehensive understanding of both your loader and microscope, please refer to your microscope operation manual.

Please prepare the cassettes and wafers at your side.

1. Precautions

Operators must follow the instructions in the Operation/Maintenance Manual. If these instructions are not

followed, safety can not be assured, and malfunctions may occur.

The following 3 types of symbols are used in this Manual to draw operators' attention.

⚠ **CAUTION** : Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE : Indicates a potentially hazardous situation which, if not avoided, may result in damage to the product or other property and/or may cause problems.

2. Safety Precautions

⚠ CAUTION

1.   Always use the power cord provided by EVIDENT. If no power cord is provided

, please select the power cord by referring to the section "PROPER SELECTION

OF THE POWER SUPPLY CORD" at the end of this chapter. If the proper power cord

is not used, EVIDENT can no longer warrant the electrical safety performance of

the equipment. Layout the power cord at a sufficient distance from the sources of

heat such as the power supply unit/light source and lamp housing to avoid

contact with these heat sources.

2.   Use the device within the scope of the specifications.

3.   When you move equipment, notify EVIDENT distributor.

4.   Always Install the product at the location where you can reach the power cord at hand to disconnect it quickly. In case the abnormality is found with the loader, pull out the power cord immediately from the back side of the loader.

5.   Bundle cables or tubes to the table legs, etc. to prevent your legs from getting caught in cables or tubes.

6.   Be sure to connect the ground terminal of the power cord and that of the power outlet. Otherwise, the electric safety performance intended by EVIDENT cannot be assured.

7.   Never place a metallic object in the ventilation. This could cause an electrical shock or malfunction.

8.   Maintenance works must be done by well-trained person.

9.   When it cleans a broken wafers, it is use with protection gloves etc.

10. In case the vacuum supply is stopped, a risk of dropping the wafer may be caused during the test. It is recommended to connect the check valve or the buffer tank in order to maintain the vacuum in case the vacuum supply is stopped. The check valve

or the buffer tank is not provided with this product. If you need them, contact EVIDENT.

11. Be careful, if you transfer the wafer in the down-flow status that may allow the wafer to sway, the risk may be caused in transferring the wafer.

12. Be sure to use the cassette complied with SEMI standards. Using the distorted cassette may cause the risk of damaging the wafer, etc.

13. To allow each microscope manifest its full performance, reserve an installation space

having the minimum dimensions described below before assembly and installation

of the microscope.

*The dimensions of the area enclosed in alternate long and two short dashes lines

indicate the stage movement range.*When maintenance is required, a larger work

space can be prepared by changing the observation tube orientation or moving

the stage.

*The following installation space is set according to the SEMI standard guidelines

(SEMI S8-1016).It is recommended that you set the optimum installation space

for each customer by referring to the following installation space data as well as

the appearance of the system, eye point height, etc.

14. FOUP opener is equipped with a power shut-off switch, located near the top edge of the open door.

This switch is mechanically coupled with the window opening/closing system.

The switch is exposed on the upper position of the door while the window is open

,and stored in a position where it does not touch the door while the window is closed.

If the door of the FOUP opener closes while the window is open, the switch is turned off

and the power of the FOUP opener is shut off.This system prevents injuries from getting
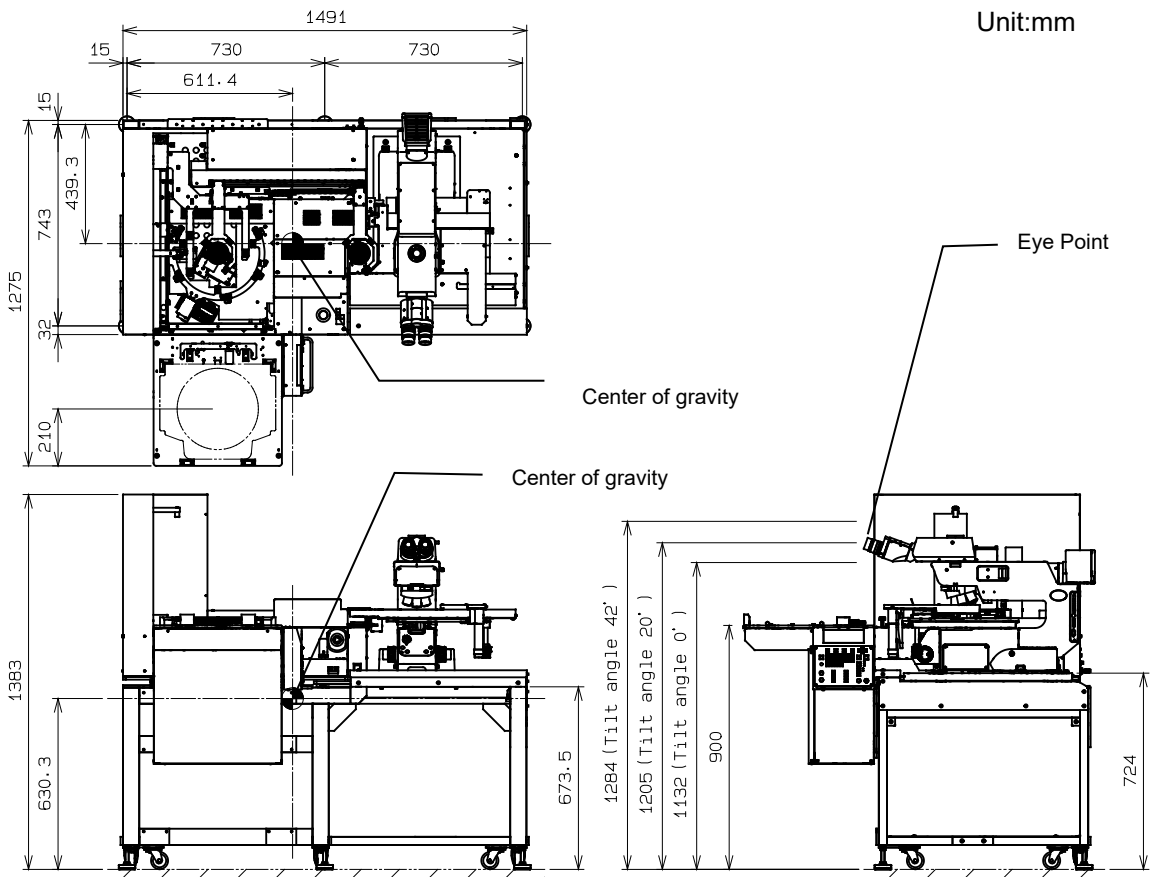
hands caught in the door.

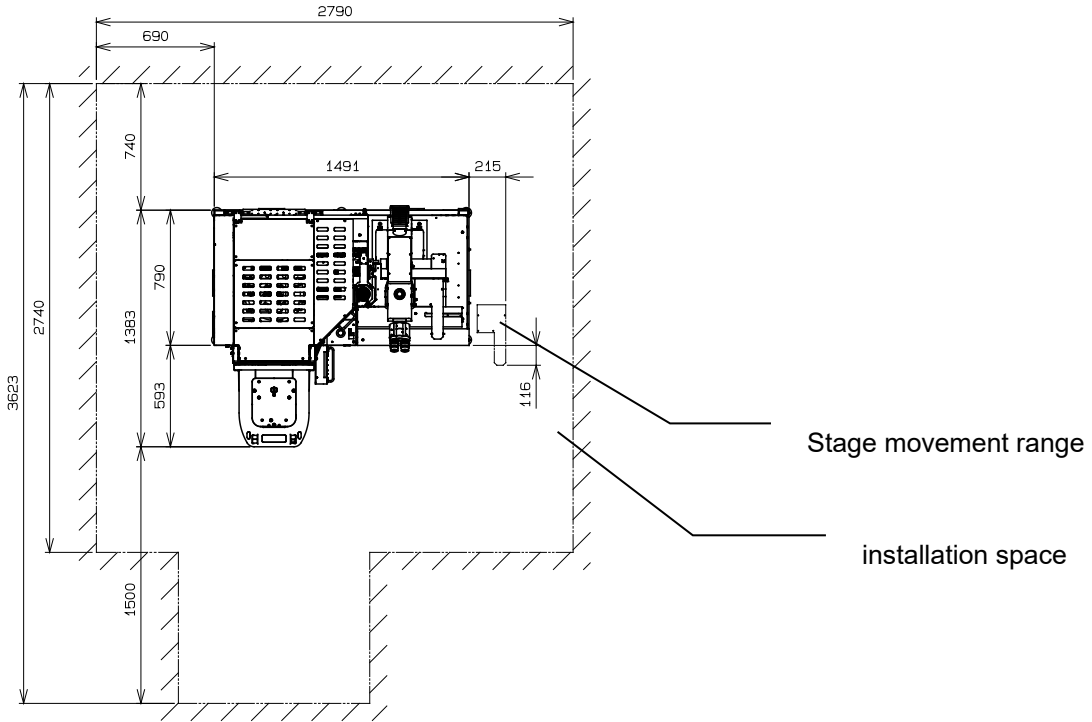AL120-LMB12-F installation space   Unit:mm

Stage movement range

installation space

AL120-LMB12-F extermal view,eye point and center of gravity
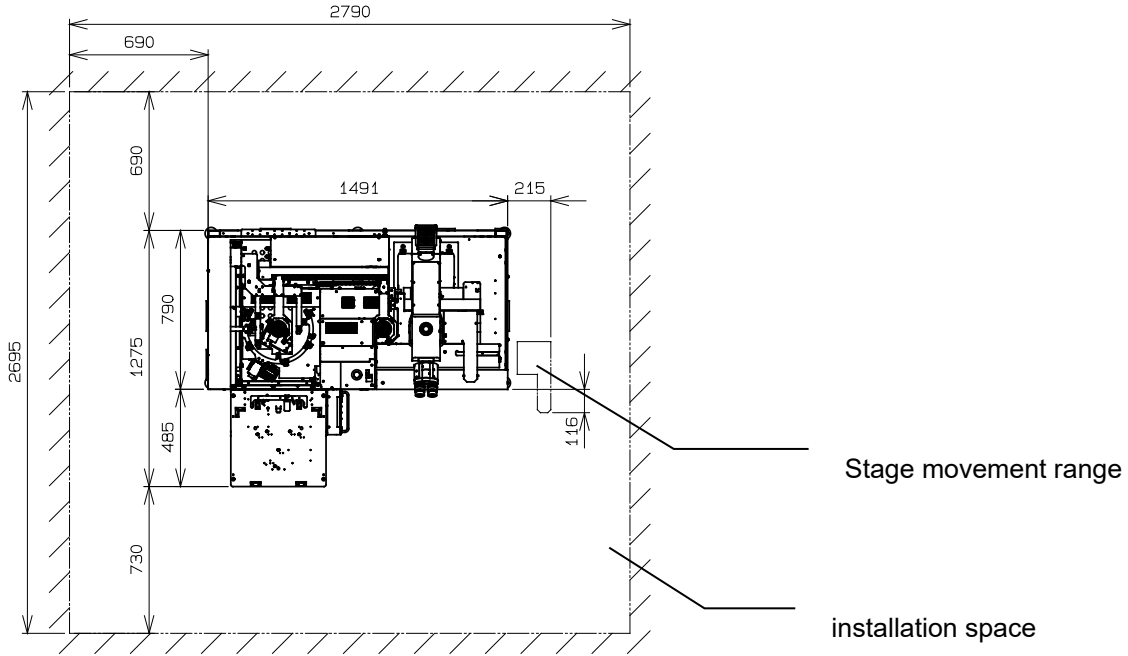
Unit:mm

Eye Point

Center of gravity

Center of gravity

AL120-LMB12-LP3 installation space   Unit:mm

Stage movement range

installation space

AL120-LMB12-LP3 extermal view,eye point and center of gravity
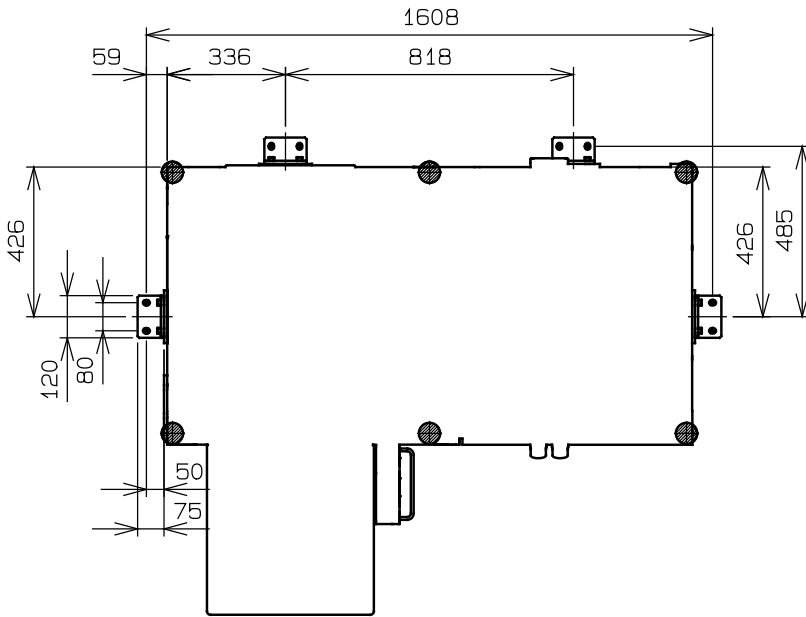
Unit:mm

Center of gravity

Center of gravity

Eye Point
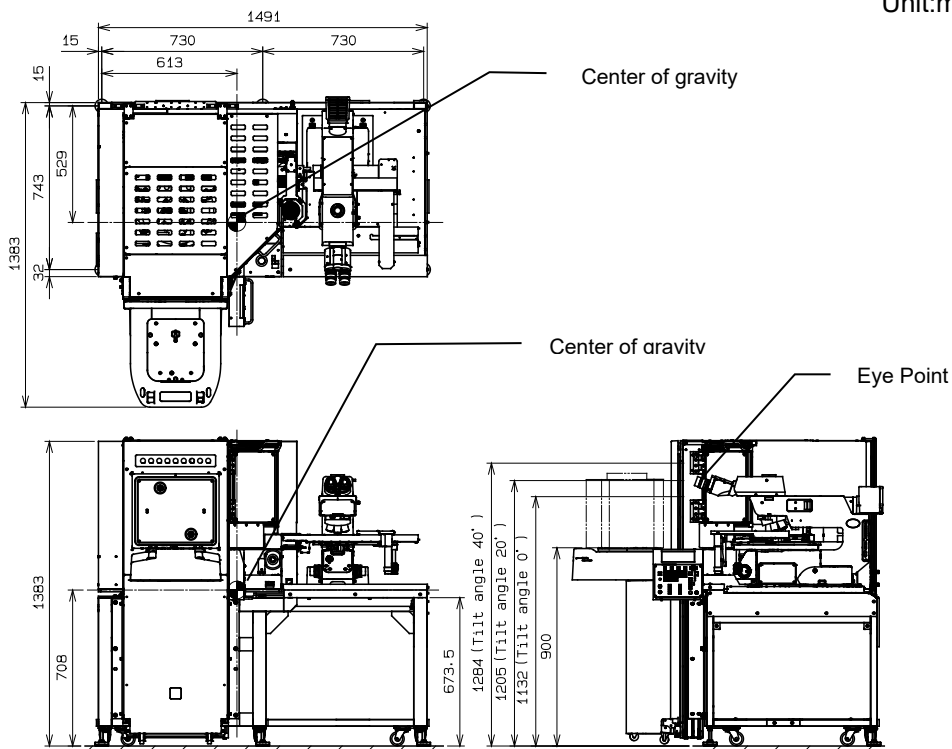
Earthquake Protection

Please fix the equipment to the supporting floor so as not to be moved by unexpected force such as an earthquake using stoppers or equivalent means as per the requirements.
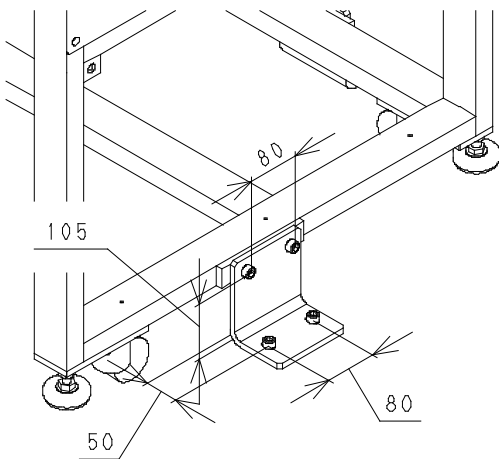
Quakeproof fixed parts (Option)

Material: Stainless Steel

Plate Thickness: 9mm

Fixing bolts: M10

Safety Symbols

The following symbols are affixed to the device. In order to safely operate this device, be sure to familiarize yourself with the meanings of individual symbols.

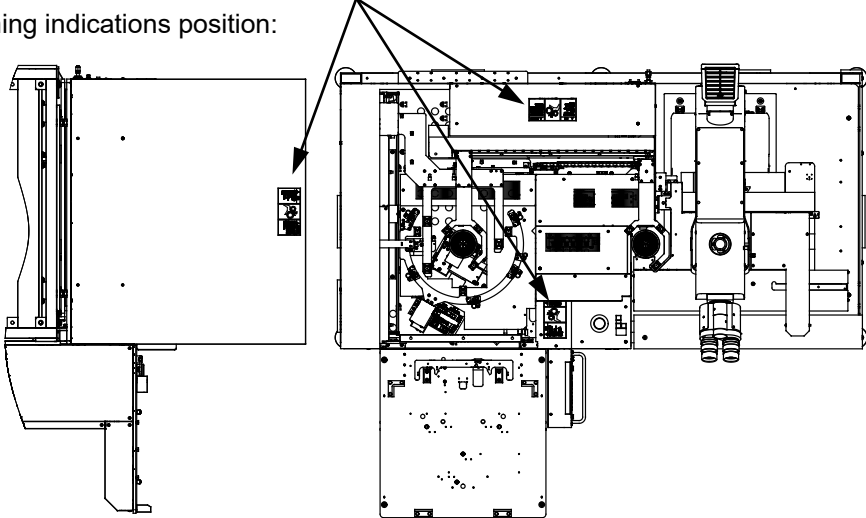|	
⚙	This symbols indicate the presence of mechanical parts that can result in pinching, crushing or other bodily injury.
I	Indicates that the main switch is ON.
O	Indicates that the main switch is OFF.

Warning Indications

Warning indications are attached on the part which the special attention should be paid to the safety when operating/using the equipment.

Follow the instructions surely.

⚠ **CAUTION**

MECHANICAL HAZARD
Contact with moving parts causes injury by getting caught or pinched.
Keep hands and garments away from moving parts.
Consult manual for servicing instructions.

Warning indications position:

Each arm of this device is electric drive.

The whole device movement is attention not to put a hand and a face in a device.

If these symbols become dirty or peel off, contact your nearest EVIDENT distributor for exchange and servicing.
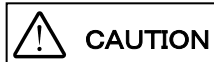
3. Before Starting Operations

In order to get the best performance from the loader, as well as to ensure safety, please follow the 3 points listed below.

⚠ CAUTION

1. **Never put your hands in the loader.**
2. **Do not deliberately place wafers or other objects in or remove from the loader while it is in operation.**
   If excess force is applied to the wafer under inspection, it could lose its adhesiveness and could be damaged.
3. **Make sure that the main switch is turned off before removing a wafer for unavoidable reasons such as malfunctions.**

4. Maintenance and Storage

⚠ CAUTION

Be sure to set the main stich to ○(OFF) and disconnect the power cord from the back side of the loader before starting following operations.

1. **Wipe each part of the loader using a soft cloth moistened with pure water.**
   Wipe heavy dirt or stains with a clean paper moistened with commercially available absolute alcohol.
   Never place absolute alcohol close to a flame as it is highly flammable.
   Take care not to cause sparks by turning on or off an electric appliance or fluorescent lamp.

2. **Wear gloves to protect your hands while cleaning the loader when for example a wafer is damaged.**

3. **Periodically check the loader for wear (a wafer loading arm and deterioration of the drive mechanism), and replace the parts as needed. Contact your nearest EVIDENT distributor for repair.**

NOTICE

1. **Never disassemble the loader unnecessarily. This could affect the performance and function of the loader.**

2. **Contact your nearest EVIDENT distributor if you need MSDS.**

3. **Confirm and observe your local municipal ordinances or regulations when you dispose of the loader.**
   If you have any questions, contact your nearest EVIDENT distributor.

4. **Lenses and solders used by this system are lead-free.**

5. Daily Check

1. Confirm the following points before operating the loader.

(1)   Vacuum supply pressure: -67KPa to -80KPa

      When there are not a vacuum gauge and a regulator, please contact it to the EVIDENT distributor.

(2)   Clean dry air supply pressure : 0.5MPa to 0.6MPa. [AL120-LMB12-LP3]

(3)   Make sure that there are no wafers or tools inside the wafer loader

2. Confirm the following points before starting the inspection.

(1)   Make sure that the power is on (Check the liquid crystal panel)
Turn the main switch ON and make sure that each arm position is initialized and the model name is shown on the liquid crystal panel. The loader may have been set to skip initialization when the power is turned on. This is not a malfunction. The loader executes initialization when the [Start] button is pressed.

```
AL120-LMB12-LP3          ALL

Press Start button

No |Size |Thick     |Comment
1. |300  |775-500   |

Recall    Wafer    Setting   Memory
```

(2)   Check the Emergency Off Switch
When the Emergency Off Switch is pressed, make sure that the power supply shuts down and the main switch turns OFF.

(3)   Confirmation of automatic power supply interception of FOUP opener

      Open the observation window, and select [Test Program] -> [Test No.1] -> <Menu2>[M2], and then start <Z axis movement check> by pressing the start switch.

      Make sure that the door of the FOUP opener rises and the power of the FOUP opener is shutoff by the interlock switch.

(4)   Please make sure to close the observation window for macroinspection before turn on the power.

⚠ CAUTION   **Please never put the hand in the FOUP door while this device is working**

6. Conformity Standards

(1) This equipment is carrying out conformity or evaluation to the following standard.

(2) Although this equipment aims at using in the industrial environment, since it may not satisfy a performance when not used by the right operation method, please carry out the proper handling according to this manual.

⚠ CAUTION	**This equipment is an object for industrial environment (Class A). Other equipment may be affected if it is used in a housing environment.**

FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, use, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

⚠ CAUTION	**FCC WARNING:** Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Supplier's Declaration of Conformity
Hereby declares that the product
      Product name: Semiconductor Wafer Loader, Semiconductor Wafer Loader and Accessory
      Model Number: AL120-LMB12-LP3
Conforms to the following specifications:
      FCC Part 15, Subpart B, Section 15.107 and Section 15.109
Supplementary Information:
      This device complies with part 15 of the FCC Rules. Operation is subject to the following two
      conditions: (1) This device may not cause harmful interference, and (2) this device must
      accept any interference received, including interference that may cause undesired operation.
Responsible Party Name: EVIDENT Scientific Solutions Americas Corp.
Address: 48 Woerd Ave Waltham, MA 02453, U.S.A.
Phone Number: 781-419-3900

SEMI

This equipment is carrying out evaluation to the guideline of the following SEMI standard.

・S2-1016: Safety Guidelines for Semiconductor Manufacturing Equipment
・S8-1016: Safety Guidelines for Ergonomics Engineering of Semiconductor Manufacturing Equipment

For Korea only
이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용
환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

■ PROPER SELECTION OF THE POWER SUPPLY CORD

If no power supply cord is provided, please select the proper power supply cord for the equipment by referring to "Specifications" and "Certified Cord" below:

CAUTION: In case you use a non-approved power supply cord for Olympus products, Olympus can no longer warrant the electrical safety of the equipment.

Specifications

Voltage Rating	125V AC (for 100-120V AC area) or, 250V AC (for 220-240V AC area)
Current Rating	6A minimum
Temperature Rating	60°C minimum
Length	3.05 m maximum
Fittings Configuration	Grounding type attachment plug cap. Opposite terminates in molded-on IEC configuration appliance coupling.

Table 1 Certified Cord

A power supply cord should be certified by one of the agencies listed in Table 1, or comprised of cordage marked with an agency marking per Table 1 or marked per Table 2. The fittings are to be marked with at least one of agencies listed in Table 1. In case you are unable to buy locally in your country the power supply cord which is approved by one of the agencies mentioned in Table 1, please use replacements approved by any other equivalent and authorized agencies in your country.

Country	Agency	Certification mark	Country	Agency	Certification mark
Argentina	IRAM		Italy	IMQ	
Australia	SAA		Japan	JET	
Austria	ÖVE		Netherlands	KEMA	
Belgium	CEBEC		Norway	NEMKO	
Canada	CSA		Spain	AEE	
Denmark	DEMKO		Sweden	SEMKO	
Finland	FEI		Switzerland	SEV	
France	UTE		United Kingdom	ASTA BSI	
Germany	VDE		U.S.A	UL	
Ireland	NSAI				

Table 2 HAR flexible cord

Approval organizations and cordage harmonization marking methods

Approval organization	Printed or embossed harmonization marking (May be located on jacket or insulation of internal wiring)		Alternative marking utilizing black-red-yellow thread (Length of color section in mm)		
			Black	Red	Yellow
Comite Electrotechnique Belge (CEBEC)	CEBEC	⟨HAR⟩	10	30	10
Verband Deutscher Elektrotechniker (VDE) e.V. Prüfstelle	⟨VDE⟩	⟨HAR⟩	30	10	10
Union Technique de l'Electricite' (UTE)	USE	⟨HAR⟩	30	10	30
Instituto Italiano del Marchio di Qualita' (IMQ)	IEMMEQU	⟨HAR⟩	10	30	50
British Approvals Service for Electric Cables (BASEC)	BASEC	⟨HAR⟩	10	10	30
N.V. KEMA	KEMA-KEUR	⟨HAR⟩	10	30	30
SEMKO AB Svenska Elektriska Materielkontrollanstalter	SEMKO	⟨HAR⟩	10	10	50
Österreichischer Verband für Elektrotechnik (ÖVE)	⟨ÖVE⟩	⟨HAR⟩	30	10	50
Danmarks Elektriske Materialkontroll (DEMKO)	⟨DEMKO⟩	⟨HAR⟩	30	10	30
National Standards Authority of Ireland (NSAI)	⟨NSAI⟩	⟨HAR⟩	30	30	50
Norges Elektriske Materiellkontroll (NEMKO)	NEMKO	⟨HAR⟩	10	10	70
Asociacion Electrotecnica Y Electronica Espanola (AEE)	⟨UNED⟩	⟨HAR⟩	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT	⟨HAR⟩	30	30	70
Instituto Portages da Qualidade (IPQ)	np	⟨HAR⟩	10	10	90
Schweizerischer Elektro Technischer Verein (SEV)	SEV	⟨HAR⟩	10	30	90
Elektriska Inspektoratet	SETI	⟨HAR⟩	10	30	90

Underwriters Laboratories Inc. (UL)   SV, SVT, SJ or SJT, 3 X 18AWG
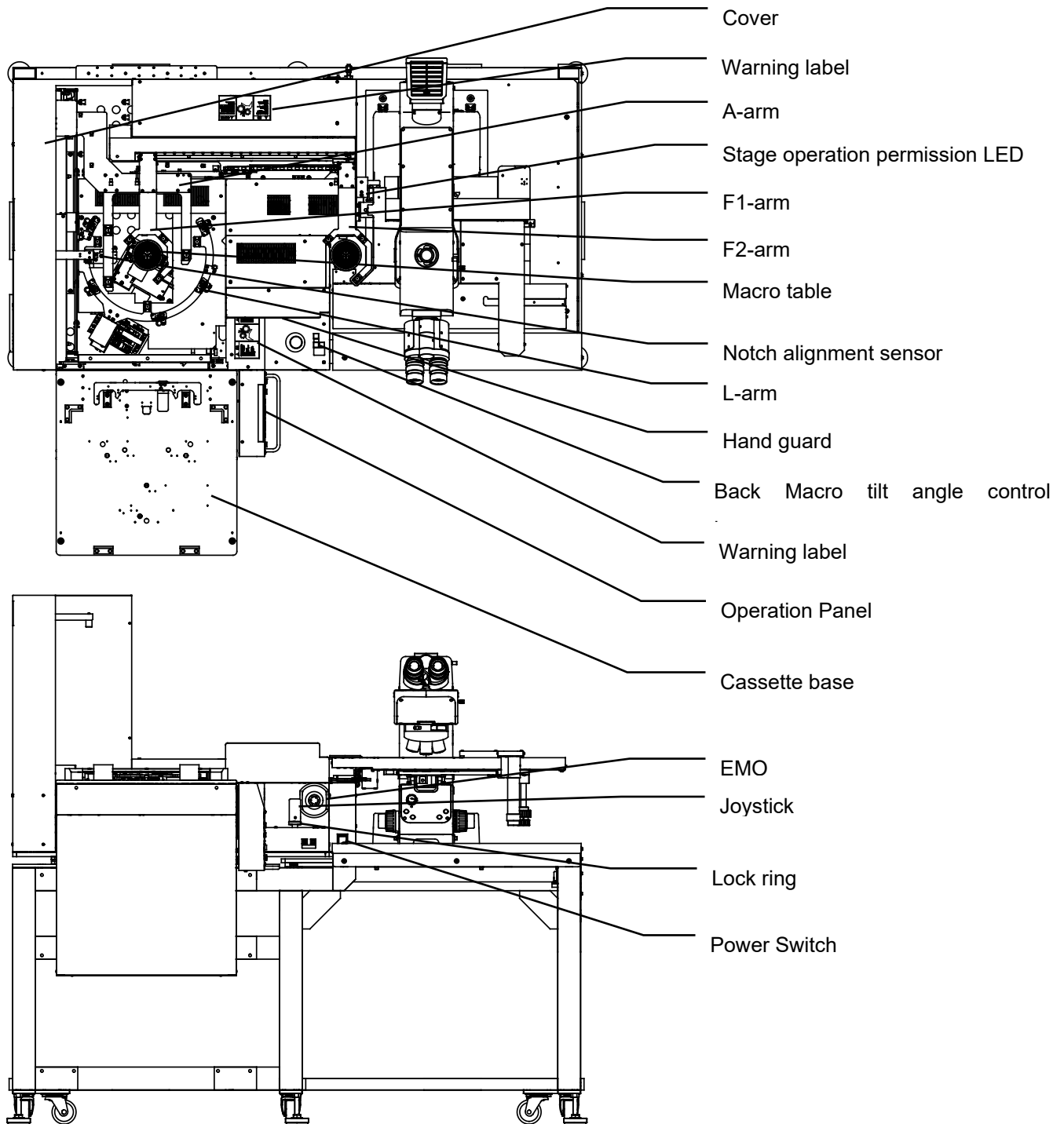Canadian Standards Association (CSA)   SV, SVT, SJ or SJT, 3 X 18AWG

Table of Contents

Table of Contents

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1 Nomenclature

1-1 Wafer Loader Main Body

1-1-1 AL120-LMB12-F

Cover

Warning label

A-arm

Stage operation permission LED

F1-arm

F2-arm

Macro table

Notch alignment sensor

L-arm

Hand guard

Back Macro tilt angle control

Warning label

Operation Panel

Cassette base

EMO

Joystick

Lock ring

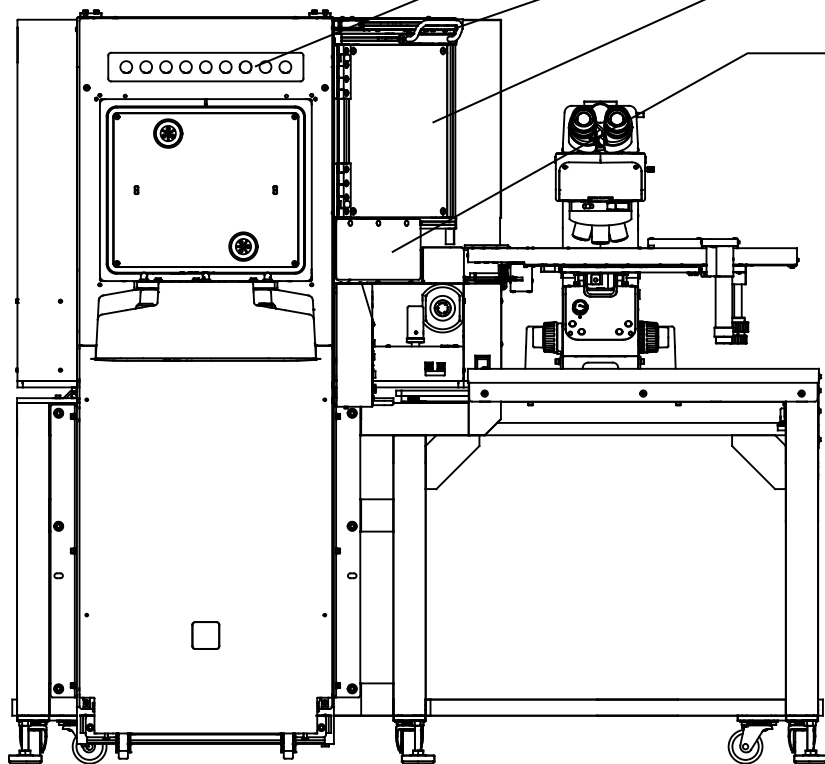Power Switch
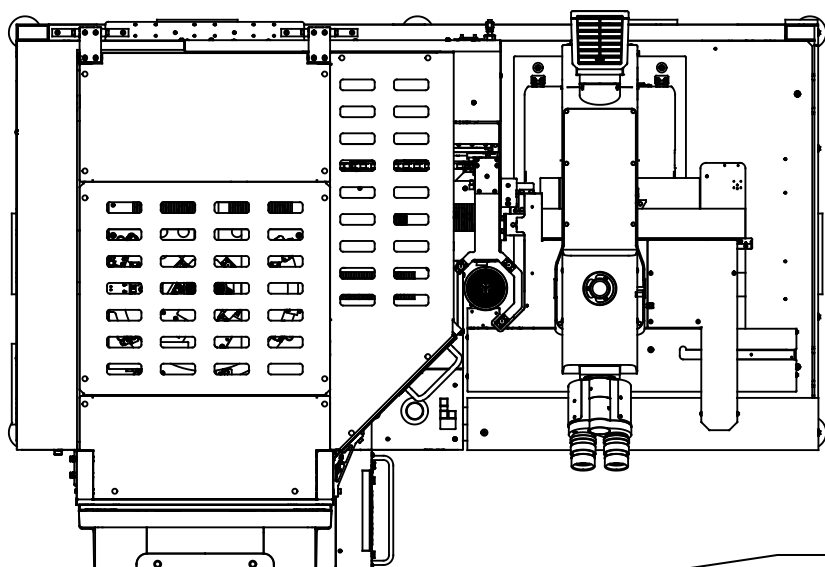
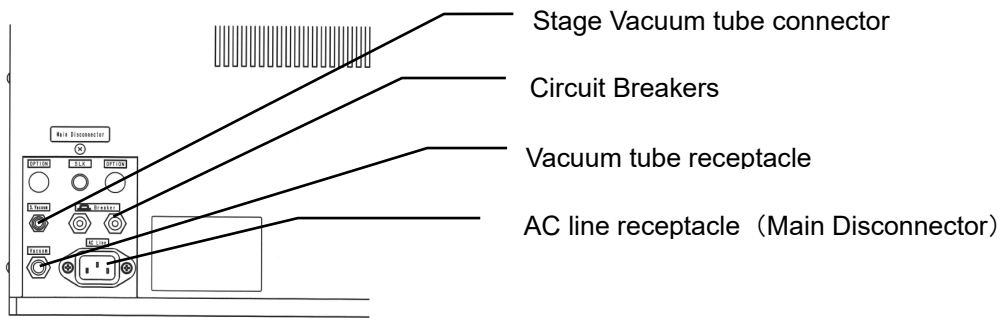## 1-1-2 AL120-LMB12-LP3

FOUP Opener

FOUP opener operation LED

Opening permission LED of the window

Inspection view window

Hand guard

1-1-3 Back part [Main Disconnector][AL120-LMB12-F]

Stage Vacuum tube connector

Circuit Breakers

Vacuum tube receptacle

AC line receptacle （Main Disconnector）

1-1-4 Back part [Main Disconnector][AL120-LMB12-LP3]

Clean dry air tube receptacle

Stage Vacuum tube connector

Circuit Breakers

Vacuum tube receptacle

AC line receptacle （Main Disconnector）

1-1-5 Operation Panel

Menu buttons

Wafer No. selector buttons

Quit button

Observation setting buttons

Wafer alignment position control

Inspection time control

M1 M2 M3 M4

Quit

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26

Cancel

Wafer alignment

Inspection Time

Sec

Observation
Top Macro
Back Macro
2nd.Back Macro
Microscope

Registration
Macro
Micro
Recall
Wafer Reject

4-way button

Unload Start

Pause

In operation
Warning
Error

All
Sampling

Option

Cancel

Slow Fast
Direction Speed
Top macro spin

Wafer unload button

Start button

Pause button

LED display

Inspection mode button

Option button

Top macro spin speed control

Top macro spin direction control

Auxiliary function buttons

1-1-6 FOUP opener operation display panel

PRESENCE PLACEMENT STATUS STATUS LOAD UNLOAD ALARM POWER

FOUP opener operation LED

• PRESENCE

• PLACEMENT

• LOAD

• UNLOAD

• ALARM

• POWER
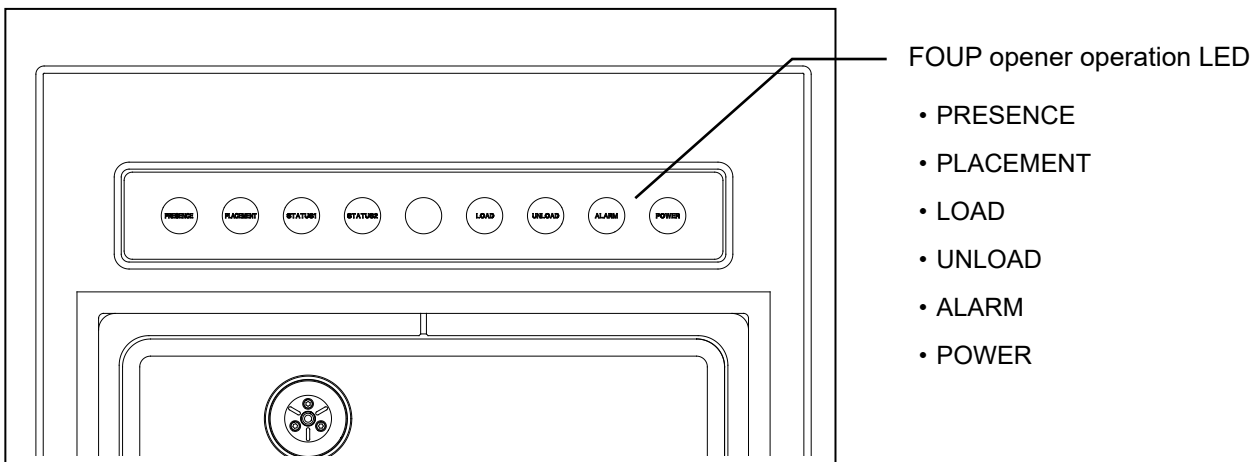
1-2 Remote Controller (Option)

Remote controller: AL120-RC

Registration setting button (Macro)

Registration setting button (Micro)

Start button

Wafer unload button
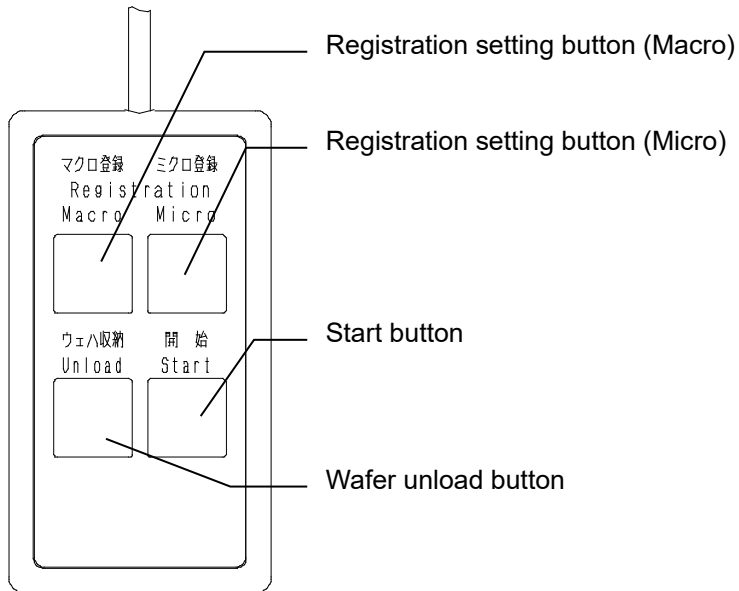
Vacuum Stage

Vacuum stage: AL120-VS12

Coarse
adjustment grip

Wafer rotating knob

Y fine travel knob

X fine travel knob

Clutch lever

Stage sensor plate

Vacuum table
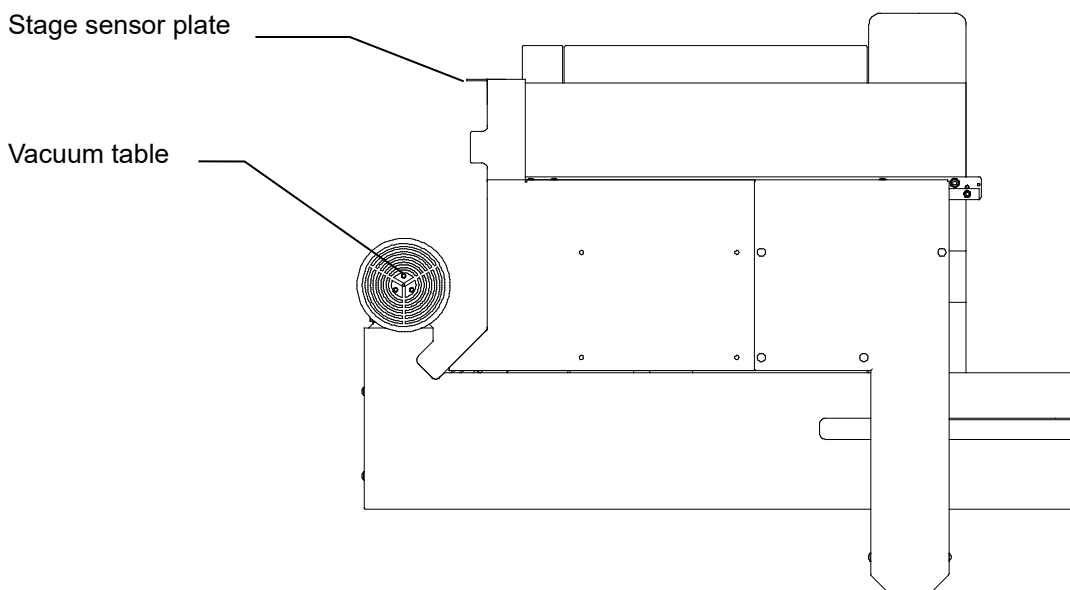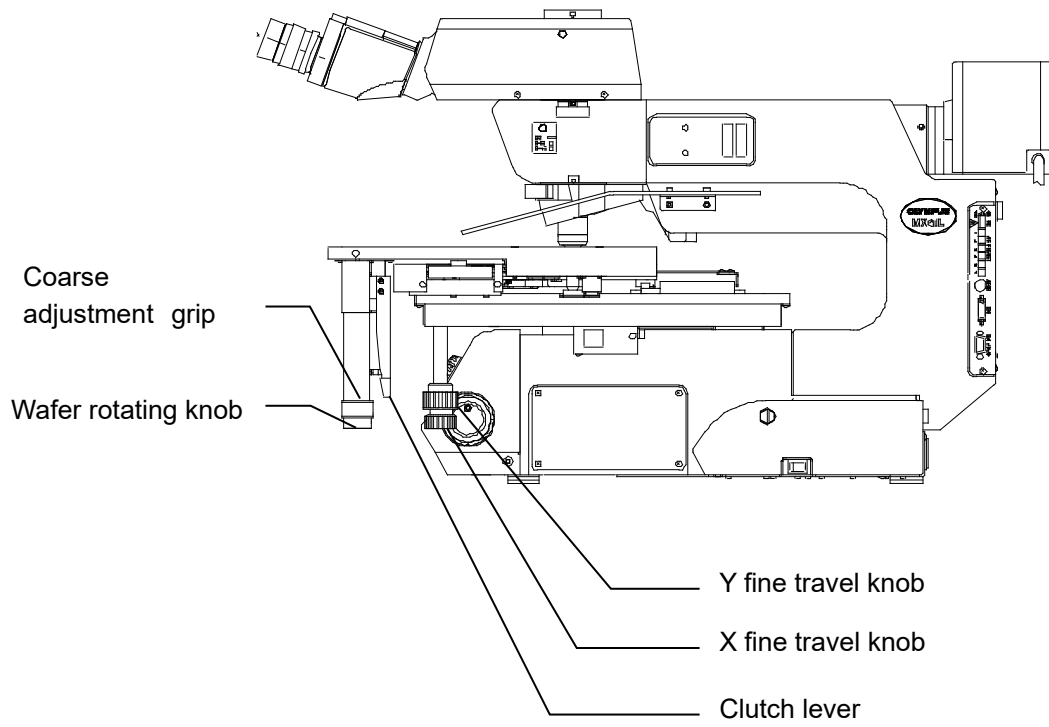
2 Adjustments

2-1 Registration of Inspection Wafer by Type

The loader requires adjustments when the cassette is changed or the thickness of the wafers to be inspected is changed.

⚠ CAUTION	**If the loader is used without any adjustment to the proper state, it may give damage to wafers. Receive the training of loader maintenance before making adjustments. To prevent danger, be sure to turn the main switch OFF and disconnect the power cord before removing the cover for adjustment work.**

1 Registration of a New Type of Inspection Wafer (Cassette to be Used and Wafer Thickness)

1-1. Main Operating Procedure

Prepare the cassette and wafer to be registered, and adjust and register them using the following procedure.

1) Activate adjustment test mode
2) Test 24 wafer type setting registration
3) Test 11 wafer mapping parameter setting registration
   Items to prepare Insert the wafers to be registered in the lowest and highest slots of the cassette.
4) Test 11 wafer mapping parameter confirmation
   Items to prepare Insert the wafers of the same thickness to be confirmed into all slots of the cassette.
5) Test 12 A-arm height (arm insertion and removal height) setting registration
   Items to prepare Insert the wafers of the same thickness to be confirmed into all slots of the cassette
6) Quit adjustment test mode

1-2. Operating Procedure

1) Activate adjustment test mode

   Turn the main switch OFF.
   Turn the main switch ON while pressing the Wafer No. selector buttons [1] and [2].

2) Wafer type setting registration

   Using Test 24, specify the wafer size, thickness, transfer speed, comment to be registered.

   ① Press the Wafer No. selector button [24], then press the [Start] button.
   ② The wafer types currently registered are displayed on the liquid crystal panel.
      Using the 4-way button, move the <x> to the item to add or change or deletion, then press the 4-way button [RIGHT].
   ③ Specify the following items.
      • Wafer size <Size>   : Select one of 300/---
      • Wafer thickness <Thick>: Select one of 775-500/500-200
      • Transfer speed <Speed>   : Select one of Fast/Middle/Slow/SP1–SP5
      • Comment <Comment>   : Input of a maximum of 16 characters is possible.
      * Refer to Section 4 Test Mode for detailed procedures.
      * There is a limit to selectable items, depending on the specifications of the loader.
      * When chose --- with a wafer size <size> column, the set point is deleted, and it is not displayed to a wafer type screen at the time of the inspection.

```
No |Size |Thick    |Speed    |comment
x1 | 300 |775-500 |High     |
 2 | 300 |775-500 |High     |
 3 | 300 |775-500 |High     |
 4 | 300 |775-500 |High     |
 5 | 300 |775-500 |High     |
 6 | 300 |775-500 |High     |
OK       Cancel   PageUp   PageDn
```

```
No |Size |Thick    |Speed    |comment
x1 | 300 |775-500 |High     |
 2 | --- |         |         |
 3 | --- |         |         |
 4 | --- |         |         |
 5 | --- |         |         |
 6 | --- |         |         |
OK       Cancel   PageUp   PageDn
```

*Indication example when registering only one kind

   ④ After settings are completed, press the [M1] button <Save> and store setting, press the [Quit] button to terminate Test 24.

3) Wafer mapping parameter setting registration

Using Test 11, set the wafer mapping parameters according to the cassette state and the wafer thickness.

① Press the Wafer No. selector button [11], then press the [Start] button.

```
M1:Mapping auto adjust
M2:Mapping result display
M3:Input parameter



Auto    Disp    Manual
```

② The submenu appears on the liquid crystal panel.
[M1]: Executes the automatic mapping parameter adjustment <Mapping auto adjust>.
Press the [M1] button <Auto>.

```
No |Size |Thick    |Speed   |comment
x1 | 300 |775-500 |High     |
 2 | 300 |775-500 |High     |
 3 | 300 |775-500 |High     |
 4 | 300 |775-500 |High     |
 5 | 300 |775-500 |High     |
 6 | 300 |775-500 |High     |
OK       Cancel   PageUp   PageDn
```

③ The wafer types currently registered are displayed on the liquid crystal panel.
Using the 4-way button, move the <x> to the item to add, then press the [M1] button <Ok>.

④ Insert the wafers to be registered in the lowest and highest slots of the cassette, and set the cassette in the cassette table.

```
M1:Adjust mapping
M2:Save
result : OK
1.Start:48500 Thick1:1500 Thick25:1500



Adjust Save
```

⑤ The menu appears on the liquid crystal panel.
[M1]: Do the mapping adjustment <Adjust mapping>.
Press the [M1] button <Adjust>.

⑥ The mapping operation starts.

⑦ If the display shows <result : OK> to indicate that the mapping data has no problems, press the [M2] <Save> button to register the data.
If the display shows NG (No Good), check the wafer insertion slot positions in the cassette.

⑧ After the setting is completed, press the [Quit] button to terminate Test 12 [M1] automatic mapping parameter adjustment.

_____

4) Checking the wafer mapping parameters

Check the wafer mapping parameters setting state using Test 12.

```
M1:Mapping auto adjust
M2:Mapping result display
M3:Input parameter



Auto    Disp    Manual
```

① From the submenu on the liquid crystal panel, execute [M2] <Mapping result display>. Press the [M2] button <Disp>.

```
No |Size |Thick    |Speed  |comment
x1 | 300 |775-500 |High    |
 2 | 300 |775-500 |High    |
 3 | 300 |775-500 |High    |
 4 | 300 |775-500 |High    |
 5 | 300 |775-500 |High    |
 6 | 300 |775-500 |High    |
OK       Cancel  PageUp  PageDn
```

② The list of wafer types currently registered are displayed on the liquid crystal panel.
Using the 4-way button, move the <x> to the item to add, then press the [M1] button <Ok>.

```
M1:Mapping
M2:Display result sensor1



Mapping Sensor1
```

③ Insert wafers to be registered into all slots of the cassette, and set the cassette in the cassette table.
④ Press the [M1] button <Mapping>.
The mapping operation starts.

```
Mapping sensor 1
No |    |P    |thick|  No|  |P    |thick
 1|OK| 48500| 1500|   6|- |   0|    0|
 2|- |    0|    0|   7|- |   0|    0|
 3|- |    0|    0|   8|- |   0|    0|
 4|- |    0|    0|   9|- |   0|    0|
 5|- |    0|    0|  10|- |   0|    0|
PageUp  PageDn  Exit
```

⑤ Press the [M2], [M3] and [M4] buttons to show the results on the liquid crystal panel.
[M1]: Executes mapping <Mapping>
[M2]: Displays the results of mapping senso <Display result sensor>

Make sure that all the slots for each sensor have indication of OK.
If there are any wafers with an "NG" indication, the wafer deflection value or the cassette pitch will vary widely.
Using Test 11 [M3]: Manual input of mapping parameters <Input parameters>, make a fine adjustment of the detection range.
* Refer to Section 4 Test Mode for detailed procedures.

5) A-arm height (arm insertion and removal height) setting registration

Items to prepare

The cassette and wafers to be registered

Specify the A-arm height by using Test 12.

```
M1:Wafer position setting
M2: A-E position search




Hight    A-E
```

```
No |Size |Thick    |Speed    |comment
x1 | 300 |775-500  |High     |
 2 | 300 |775-500  |High     |
 3 | 300 |775-500  |High     |
 4 | 300 |775-500  |High     |
 5 | 300 |775-500  |High     |
 6 | 300 |775-500  |High     |
OK      Cancel  PageUp  PageDn
```

```
M1:Vacuum ON/OFF
M2:Put a wafer on a A-arm
M3:Save
UP:A-arm 0.1mm UP
DOWN:A-arm 0.1mm DOWN


Vacuum    WEF ON   Save
```

① Press the Wafer No. selector button [12], then press the [Start] button.
② The menu appears on the liquid crystal panel.
   Execute [M1]: Wafer removal height adjustment <Wafer position setting>.
   Press the [M1] button <Height>.

③ The wafer types currently registered are displayed on the liquid crystal panel.
   Using the 4-way button, move the <x> to the item to add, then press the [M1] button <Ok>.

④ Insert wafers to be registered into all slots of the cassette, and set the cassette in the cassette table.

⑤ Using the Wafer No. selector button [13], specify the 13th slot and press the [Start] button.
   The A-arm goes up and stops at the specified removal height.

⑥ The horizontal excitation of the A-arm turns OFF.

⑦ Insert the A-arm into the cassette manually.

⑧ Make fine adjustments of the arm insertion height. The A-arm movement can be selected by using the 4-way button on the liquid crystal panel.
   [UP]: Moves the A-arm slightly up <UP: A-arm 0.1mm UP>
   [DOWN]: Moves the A-arm slightly down <DOWN: A-arm 0.1mm DOWN>
   Adjust the A-arm height so that the A-arm is inserted between the wafer to be removed (13th) and the wafer below it (12th).

⑨ Press the [M3]: Registration button <Save> to register the adjusted value.

⑩ Make fine adjustments of the wafer removal height.
   Insert the A-arm into the cassette manually.
   Switch the A-arm movement using the menu buttons on the liquid crystal panel.
   Press the [M2]: Removal height button <Put a wafer on a A-arm> to move the A-arm down to the removal height.
   Turn ON the [M1]: A-arm adsorption button.
   A-arm movement can be selected by using the 4-way button on the liquid crystal panel.
   [UP]: Moves the A-arm slightly up <UP: A-arm 0.1mm UP>
   [DOWN]: Moves the A-arm slightly down <DOWN: A-arm 0.1mm DOWN>
   Adjust the A-arm height so that the outer circumference of the adsorbed wafer is positioned at the center of the cassette slot.

⑪ Press the [M3]: Registration button <Save> to register the adjusted value.

⑫   Check the states of the 2nd and 25th wafers in the same way.

6)   Termination of adjustment test mode
      Turn the main switch OFF to terminate test mode.

2-2 Adjusting the Vacuum Switches

The vacuum switches are set for normal operation at a vacuum pressure level of -67KPa to -80KPa.
The vacuum switches must be readjusted if the vacuum pressure is outside the range of -67KPa to-80KPa.

⚠ CAUTION

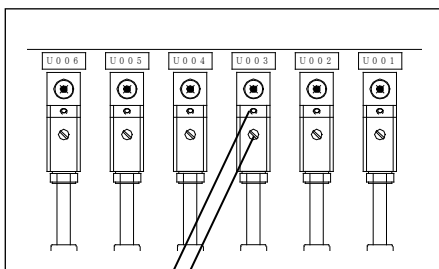**When the vacuum pressure is above -80KPa, the wafer may be bent on the wafer vacuum port.**

When the vacuum pressure is below -53KPa and when there is a rapid change in the vacuum pressure level, the wafer may be damaged.

Use of the regulator unit (option) is recommended when the vacuum pressure is above -80KPa.

1 How to adjust vacuum switches
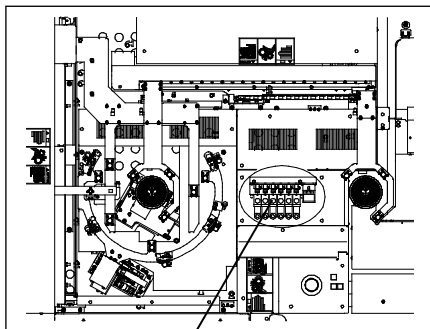
①

②
③

Tools
Phillips-head screwdriver (No. 1)
Flat-blade screwdriver（4.5mm）

Remove the cover ①. You can find following vacuum switches.
U001:Stage table
U002: A-arm
U003: Center table
U004: L-arm
U005: F-arm #1
U006: F-arm #2

Perform vacuum switch sensitivity adjustment using the testprogram No. 18.
When the vacuum switch is ON, the output display LED 2 turns red

1) Place the wafer to be adjusted on the vacuum port, and turn the solenoid valve ON.Check that the vacuum switch is turned ON.If the vacuum switch is not turned ON, turn the adjustment knob ② counter clockwise until the vacuum switch is turned ON, and further give it a 10° turn.
2) When removing the wafer and turning on the solenoid valve again, please confirm that the output display LED② is turned off.
   If it turns on, the detection setting pressure set above is too low, so return the adjustment screw ③ to the right and turn it off.

3) If normal operation is not attained after performing the above adjustments, check the vacuum pressure and flux.

3 Test Programs

Test programs are used to check and adjust the functions of each unit.

Before initiating these programs, pay special attention to interference with the other units and make sure that there are no wafers left over from previous operations.

1 How to Use the Programs

1. Turn the main switch OFF.
2. Turn the main switch ON, while pressing the Wafer No. selector buttons [1] and [2].

    If there is a wafer on the table or arm, a warning is displayed and the vacuum is maintained.

    Press the [Start] button to turn the vacuum OFF. Use wafer tweezers to prevent the wafer from falling.
3. Select a test number with a Wafer No. selector button.
4. Press the [Start] button to initiate the test.

    The menu appears on the liquid crystal panel. Select specific items in the menu by manipulating the menu buttons, 4-way buttons, [Wafer No.] buttons, etc.
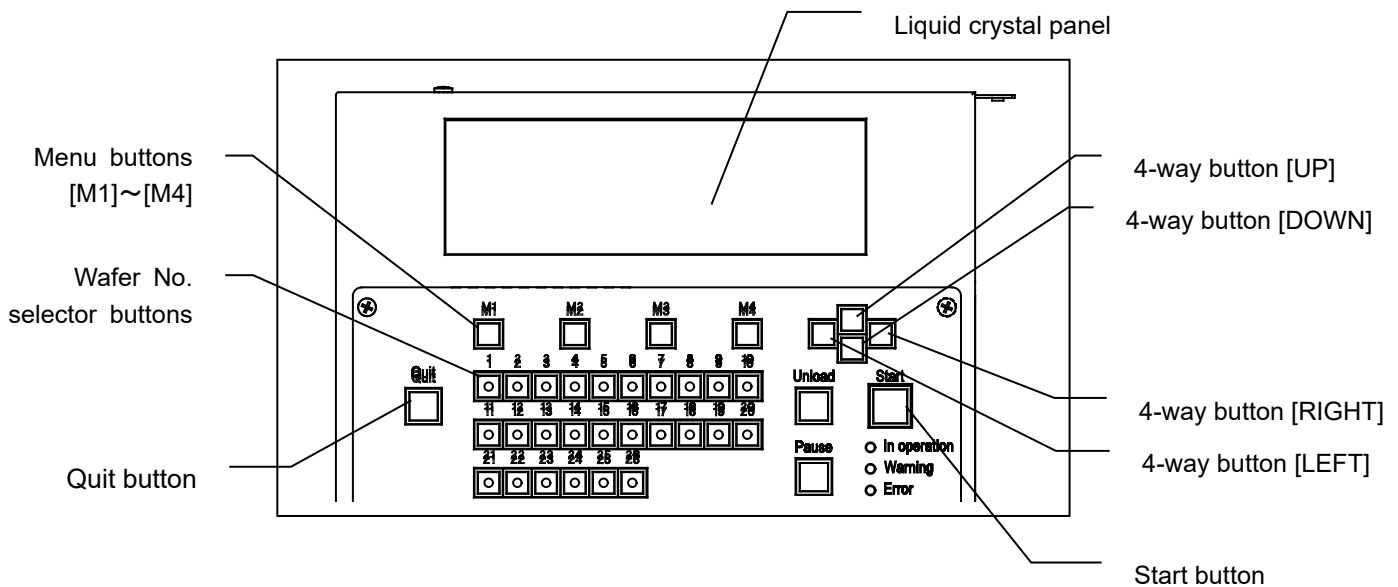
5. Press the [Quit] button to terminate the test. (The loader enters the state in step 3.)
6. Turn the main switch OFF to terminate all the tests.

2 To open the door of the FOUP opener of AL120-LMB12-LP3

With door of the FOUP opener closed, when the observation window makes its window open then close, the board on the operation panel is reset automatically.

In need of operation with the observation window open for solenoid valves check and sensors check etc, make sure to close the door of the FOPU opener before operation.

DO NOT insert hands and face into the door of the FOUP opener, it may cause serious injury.

Make sure to close the observation window before tuning on the power of the system
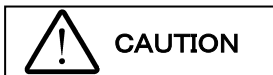
⚠ CAUTION	Do not insert hands and face into the door of FOUP opener. Do not operate the loader with the weight, etc. on the interlock switch.

interlock switch
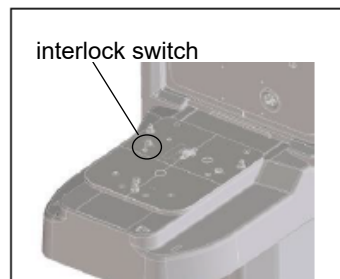
The door of the FOUP opener can be open and close by following procedure.

・To open the door of FOUP opener.
1. If the cassette is mounted on the FOUP opener, remove it.
2. Press the [M3] button, and then press the [Start] button.
   If the loader has not been initialized yet, initialize the loader. If the door of the FOUP opener is open, press the [Start] button while pressing the interlock switch of the FOUP opener, and close the door of the FOUP opener once. Do not release your hand from the interlock switch until the door of the FOUP opener closes completely.
3. If you press the [Start] button while pressing the interlock switch of the FOUP opener, the door of the FOUP opener opens. Do not release your hand from the interlock switch until the door of the FOUP opener opens completely.
4. Release your hand from the interlock switch, and press the [Start] button.

・To close the door of the FOUP opener.
1. Close the observation window.
2. Press the [M4] button, and then press the [Start] button. If the loader has not been initialized yet, initialize the loader.
3. If you press the [Start] button while pressing the interlock switch of the FOUP opener, the door of the FOUP opener closes. Do not release your hand from the interlock switch until the door of the FOUP opener closes completely.

※If you press the [Start] or the [Quit] button without pressing the interlock switch, the loader stops the operation by Error No.E1591(FOUP opener Error). Turn ON the power again.

※If you release your hand from the interlock switch during operation, the loader stops the operation to open/close the door. Press the interlock switch again to resume the operation. If you release your hand from the interlock switch for a while, the loader stops the operation by Error No.E1523（FOUP opener Error). Turn ON the power again.

3 Test Names and Functions

1.   Test names and test functions are shown in Tables 2-1 and 2-2, respectively.

Table 2-1: Test Programs

Button No.	Test Name
1	Wafer mapping sensor movement check *Applicable to AL120-LMB12-F
	FOUP-OPENER movement check *Applicable to AL120-LMB12-LP3
2	A-arm vertical movement check
3	A-arm horizontal movement check
4	A-arm side-to-side movement check
5	Macro table vertical movement check
6	L-arm vertical movement check
7	L-arm rotation check
8	F-arm vertical movement check
9	F-arm horizontal movement check
10	Centering sensor count check
11	Wafer mapping sensor mapping sensor height check *Applicable to AL120-LMB12-F
	FOUP-OPENER mapping sensor parameter setting *Applicable to AL120-LMB12-LP3
12	A-arm insertion height check and vertical movement check
13	A-arm origin in backward/forward and side-to-side direction check
14	Centering transfer position check
15	Notch alignment adjustment
16	L-arm rotation origin sensor position check
17	F-arm horizontal origin sensor position check
18	Vacuum switch check
19	Notch sensor and wafer sensor check
20	Stage lock and observation window lock movement check.
21	LED lamp check
22	Button operation check
23	Sensor and button check
24	Wafer type setting
25	Wafer unloading position adjustment
26	Software version, error log display and operation settings

Table 2-2: Test Functions

Test No./ Test Name	Function Outline
No.1 Wafer mapping sensor movement check (AL120-LMB 12-F)	<Wafer mapping sensor movement check> This program can be used to check and adjust the height of the wafer sensor. Press the [Start] button. Select the item to adjust using the menu buttons on the liquid crystal panel. [M1]：Vertical movement <Vertical movement check> [M2]：Horizontal movement <Horizontal movement check> ⚠ **CAUTION**　**Do not continue the operation for longer than 5 minutes.** **Wait for longer than one minute before restarting the operation.**
	[M1]：Vertical movement If the loader has not been initialized, initialization starts. ①Raises the wafer sensor to the cassette insertion height　②Lower limit　③Mapping end position ④Lower limit The loader then repeats steps ① to ④. • Press the [Start] button to pause the operation at the break point, and press it again to continue the operation. • When an error occurs, the loader displays the same error code as in the regular operation, and then stops. • Press the [Quit] button, and the wafer sensor returns to its initial position and the loader stops the operation.
	[M2]：Horizontal movement If the loader has not been initialized, initialization starts ①Raises the wafer sensor to the cassette insertion height.　②Cassette insertion position　③Cassette escape position. The loader then repeats steps ② to ③. • Press the [Start] button to pause the operation at the break point, and press it again to continue the operation. • When an error occurs, the loader displays the same error code as in the regular operation, and then stops. • Press the [Quit] button, and the wafer sensor returns to its initial position and the loader stops the operation.
No.1 FOUP-OPE NER movement check (AL120-LMB 12-LP3)	<FOUP Opener movement check> This program can be used to check and adjust the height of the wafer sensor. Select the item to adjust using the menu buttons on the liquid crystal panel. [M1]：FOUP Clamp, Dock, Door vacuum, Door Clamp <Menu1> [M2]：Door open, Wafer mapping, Z-axis (vertical) movement <Menu2> • Do not install the cassette except for Door vacuum. • Do not install the adapter for 8-inch cassette. (The error occurs.) ⚠ **CAUTION**　**It becomes an error by overheating when continuously operating.** **Continuous operation must be limited to 5 times or less in order to** **protect the motor from damage.**

Test No./ Test Name	Function Outline
	[M1]：FOUP Clamp, Dock, Door vacuum, Door Clamp <Menu1> This program can be used to check the operations of FOUP Clamp, Dock, Door vacuum and Door Clamp. Press the [Start] button. Select the item to adjust using the menu buttons on the liquid crystal panel. [M1]：FOUP Clamp <FOUP Clamp movement check> [M2]：Dock <FOUP Dock movement check> [M3]：Door vacuum <FOUP Door vacuum hold check> [M4]：Door Clamp <FOUP Door latch movement check>
	[M1]：FOUP Clamp <FOUP Clamp movement check> If the loader has not been initialized, initialization starts. ①FOUP Clamp ②FOUP Unclamp The loader then repeats steps ① to ②. ・ Press the [Start] button to pause the operation at the break point, and press it again to continue the operation. ・ When an error occurs, the loader displays the same error code as in the regular operation, and then stops. ・ Press the [Quit] button, and the FOUP opener returns to its initial position and the loader stops the operation.
	[M2]：Dock <FOUP Dock movement check> If the loader has not been initialized, initialization starts. ①FOUP Clamp ②FOUP Undock position ③FOUP Dock position The loader then repeats steps ② to ③. ・ Press the [Start] button to pause the operation at the break point, and press it again to continue the operation. ・ When an error occurs, the loader displays the same error code as in the regular operation, and then stops. ・ Press the [Quit] button, and the FOUP opener returns to its initial position and the loader stops the operation.
	[M3]：Door vacuum <FOUP Door vacuum hold check> If the loader has not been initialized, initialization starts. ①FOUP Clamp ②FOUP Dock position ③FOUP Door vacuum ④Cancel FOUP Door vacuum The loader then repeats steps ③ to ④. ・ Press the [Start] button to pause the operation at the break point, and press it again to continue the operation. ・ When an error occurs, the loader displays the same error code as in the regular operation, and then stops. *If the operation starts without installing the FOUP cassette, the error occurs. ・ Press the [Quit] button, and the FOUP opener returns to its initial position and the loader stops the operation.

Test No./ Test Name	Function Outline
	[M4]：FOUP Clamp <FOUP Door latch movement check> If the loader has not been initialized, initialization starts. ①FOUP Clamp ②FOUP Dock position ③FOUP Door Clamp ④FOUP Door Unclamp The loader then repeats steps ③ to ④. ・ Do not install the cassette. ・ Press the [Start] button to pause the operation at the break point, and press it again to continue the operation. ・ When an error occurs, the loader displays the same error code as in the regular operation, and then stops. ・ Press the [Quit] button, and the FOUP opener returns to its initial position and the loader stops the operation.
	[M2]：Door open, Wafer mapping, Z-axis (vertical) movement <Menu2> This program can be used to check the operations of Door open, Wafer mapping and Z-axis (vertical) movement. [M1]：Door open <FOUP Door open close check> [M2]：Wafer mapping <Wafer mapping sensor movement check> [M3]：Z-axis (vertical) movement <Z axis movement check>
	[M1]：Door open <FOUP Door open close check> If the loader has not been initialized, initialization starts. ①FOUP Clamp ②FOUP Dock position ③FOUP Door Clamp ④FOUP Door open ⑤FOUP Door close The loader then repeats steps ④ to ⑤. ・ Do not install the cassette. ・ Press the [Start] button to pause the operation at the break point, and press it again to continue the operation. ・ When an error occurs, the loader displays the same error code as in the regular operation, and then stops. ・ Press the [Quit] button, and the FOUP opener returns to its initial position and the loader stops the operation.
	[M2]：Wafer mapping <Wafer mapping sensor movement check> If the loader has not been initialized, initialization starts. ① FOUP Door open. ② Press the interlock switch and the [Start] button. ③ Lowers the FOUP Door map start position. ④ Insert the map sensor. ⑤Escape the map sensor. The loader then repeats steps ④ to ⑤. ・ Do not install the cassette. ・ Press the [Start] button to pause the operation at the break point, and press it again to continue the operation. ・ When an error occurs, the loader displays the same error code as in the regular operation, and then stops. ・ Press the [Quit] button, the loader stops the continuous operation. If you press the [Start] button while pressing the interlock switch of the FOUP opener, the loader returns to its initial position and stops the operation.

Test No./ Test Name	Function Outline
	[M3]：Z-axis (vertical) movement <Z axis movement check> If the loader has not been initialized, initialization starts. ① FOUP Door open.　② Press the interlock switch and the [Start] button. ③ FOUP Door lower limit position.　④FOUP Door upper limit position. The loader then repeats steps ③ to ④. ・Keep the interlock switch pressed while operating ③ and ④. ・Do not install the cassette. ・Press the [Start] button to pause the operation at the break point, and press it again to continue the operation. ・When an error occurs, the loader displays the same error code as in the regular operation, and then stops. ・If you press the [Quit] button while pressing the interlock switch, the loader returns to its initial position and stops the operation.
No. 2 A-arm vertical movement check	<A-arm vertical movement check> This program can be used to check the A-arm vertical movement. Press the [Start] button. Select the item to adjust using the menu buttons on the liquid crystal panel. [M1]：A-arm insertion height <A-arm insertion height> [M2]：Wafer removal height <Wafer insertion height> ⚠ CAUTION　**Do not continue the operation for longer than 5 minutes.** **Wait for longer than one minute before restarting the operation.** [M1]：A-arm insertion height <A-arm insertion height> Select the operation speed using the menu buttons on the liquid crystal panel. 　[M1]: High speed <Fast speed>　[M2]: Medium speed <Middle speed>　[M3]: Low speed <Slow speed> 　• If you do not specify anything here, the loader will operate at the high speed [M1]: High speed <Fast speed> setting. Press the [Start] button, and the loader starts the operation. If the loader has not been initialized, initialization starts. ①Height corresponding to 1 to 25 wafers　②Upper limit　③Lower limit The loader then repeats steps ① to ③. • Press the [Start] button to pause the operation at the break point. • The speed can be changed during the pause. • When an error occurs, the loader displays the same error code as in the regular operation, and then stops. • Press the [Quit] button, and the A-arm returns to its initial position and the loader stops the operation. [M2]：Wafer removal height <Wafer insertion height> Select the operation speed using the menu buttons on the liquid crystal panel. 　[M1]: High speed <Fast speed>　[M2]: Medium speed <Middle speed>　[M3]: Low speed <Slow speed> 　• If you do not specify anything here, the loader will operate at the high speed [M1]: High speed <Fast speed> setting. Press the [Start] button, and the loader starts the operation. If the loader has not been initialized, initialization starts. ①Height corresponding to 1 to 25 wafers　②Upper limit　③Lower limit The loader then repeats steps ① to ③.

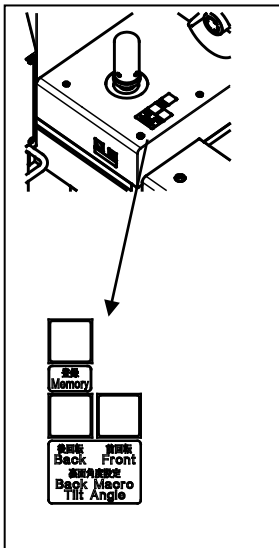| Test No./ Test Name	Function Outline
	• Press the [Start] button to pause the operation at the break point. • The speed can be changed during the pause. • When an error occurs, the loader displays the same error code as in the regular operation, and then stops. • Press the [Quit] button, and the A-arm returns to its initial position and the loader stops the operation.

No. 3
A-arm horizontal movement check
	<A-arm horizontal movement check>
	This program can be used to check the A-arm horizontal movement.
	
	Select the operation speed using the menu buttons on the liquid crystal panel.
	  [M1]**:** High speed <Fast speed> [M2]**:** Medium speed <Middle speed> [M3]**:** Low speed <Slow speed>
	    • If you do not specify anything here, the loader will operate at the high speed [M1]: High speed <Fast speed> setting.
	Press the [Start] button.
	If the loader has not been initialized, initialization starts.
	
	① Press the interlock switch and the [Start] button.
	② FOUP Door open. (AL120-LMB12-LP3 only.)
	③ When the door opens completely, release your hand from the interlock switch, and press the [Start] button. (① to ③ are for AL120-LMB12-LP3 only.）
	④ Moves to upper limit height.
	⑤ Center of Macro table → Cassette side
	⑥ Cassette side → Center of Macro table
	⑦ Center of Macro table → Standby position
	⑧ Standby position → Cassette side
	⑨ Cassette side → Standby position
	⑩ Standby position → Center of Macro table
	The loader then repeats steps ⑤ to ⑩.
	• The operation will not start if a cassette is set on the elevator.
	• Press the [Start] button to pause the operation at the break point.
	• The speed can be changed during the pause.
	• When an error occurs, the loader displays the same error code as in the regular operation, and then stops.
	• Press the [Quit] button, the A-arm returns to its initial position. Then, if you press the [Start] button or the [Quit] button while pressing the interlock switch of the FOUP opener, the FOUP door closes and the loader stops the operation.
	
	⚠ CAUTION **A-arm moves horizontally to the cassette installation part at high speed.**
	When the FOUP Door opening and shutting part is carelessly looked into, it is likely to injure in A-arm that moves.
	Do not continue the operation for longer than 5 minutes.
	Wait for longer than one minute before restarting the operation.

Test No./ Test Name	Function Outline
No. 4 A-arm side-to-side movement check	<A-arm side-to-side movement check> This program can be used to check the A-arm side-to-side movement. Press the [Start] button. If the loader has not been initialized, initialization starts. ①Right side (+4mm) ②Origin ③Left side ④OriginThe loader then repeats steps ① to ④. • Press the [Start] button to pause the operation at the break point. • When an error occurs, the loader displays the same error code as in the regular operation, and then stops. • Press the [Quit] button, and the A-arm returns to its initial position and the loader stops the operation. ⚠ CAUTION **Do not continue the operation for longer than 1 minutes.** **Wait for longer than one minute before restarting the operation.**

| No. 5 Macro table vertical movement check | <Macro table vertical movement check>
This program can be used to check the vertical movement of the Top Macro inspection table.

Press the [Start] button.
Select the operation speed using the menu buttons on the liquid crystal panel.
   [M1]: High speed <Fast speed>   [M2]: Medium speed <Middle speed>   [M3]: Low speed <Slow speed>
   • If you do not specify anything here, the loader will operate at the high speed [M1]: High speed<Fast speed> setting.

Press the [Start] button and the loader starts the operation.
If the loader has not been initialized, initialization starts.
① Raises the macro table ②Lowers the macro table
The loader then repeats steps ①to ②.

• Press the [Start] button to pause the operation at the break point.
• The speed can be changed during the pause.
• When an error occurs, the loader displays the same error code as in the regular operation, and then stops.
• Press the [Quit] button, and the macro table returns to its initial position and the loader stops the operation.

⚠ CAUTION **Do not continue the operation for longer than 5 minutes. Wait for longer than one minute before restarting the operation.** |
| No. 6 L-arm vertical movement check | <L-arm vertical movement check>
This program can be used to check the L-arm vertical movement.

Press the [Start] button.
Select the operation speed using the menu buttons on the liquid crystal panel.
   [M1]: High speed <Fast speed>   [M2]: Medium speed <Middle speed>   [M3]: Low speed <Slow speed>
   • If you do not specify anything here, the loader will operate at the high speed [M1]: High speed <Fast speed> setting.

Press the [Start] button and the loader starts the operation.
If the loader has not been initialized, initialization starts.
①Raises the L-arm (Lower limit → Middle point) ②Raises the L-arm (Middle point → Upper limit)
③Lowers the L-arm (Upper limit → Middle point) ④Lowers the L-arm (Middle point → Lower limit)
The loader then repeats steps ①to ④.

• Press the [Start] button to pause the operation at the break point.
• The speed can be changed during the pause.
• When an error occurs, the loader displays the same error code as in the regular operation, and then stops.
• Press the [Quit] button, and the L-arm returns to its initial position and the loader stops the operation.

⚠ CAUTION **Do not continue the operation for longer than 5 minutes. Wait for longer than one minute before restarting the operation.** |

No. 7 L-arm rotation check	**<L-arm rotation check>**
	This program can be used to check the L-arm rotation.
	
	Press the [Start] button. If the loader has not been initialized, initialization starts.
	Select the operation speed using the menu buttons on the liquid crystal panel.
	  [M1]: High speed <Fast speed> [M2]: Medium speed <Middle speed> [M3]: Low speed <Slow speed>
	  • If you do not specify anything here, the loader will operate at the high speed [M1]: High speed <Fast speed> setting.
	
	Press the [Start] button and the loader starts the operation.
	①Raises the L-arm
	②Rotates the L-arm to registered position
	③Rotates the L-arm when the rotation button is pressed
	 ・Press the button for registering the tilt position [Memory], and the L-arm rotates and stops at the registered position.
	 ・By pressing and holding down the button [Memory] for registering the tilt position, you can register the position where the L-arm is presently located.
	By pressing the [M4]: <Return L-arm to registered tilt angle position>, you can make the L-arm return to the initially registered tilt position.
	 ・The speed can be changed during the pause.
	 ・When an error occurs, the loader displays the same error code as in the regular operation, and then stops.
	 ・Press the [Quit] button, and the L-arm returns to its initial position and the loader stops the operation.
	To save the registered position, press the button [Memory] for registering the tilt position.
	
	⚠ CAUTION **Do not continue the operation for longer than 5 minutes.**
	Wait for longer than one minute before restarting the operation.

No. 8 F-arm vertical movement check	**<F-arm vertical movement check>**
	This program can be used to check the F-arm vertical movement.
	
	Press the [Start] button.
	Select the operation speed using the menu buttons on the liquid crystal panel.
	  [M1]: High speed <Fast speed> [M2]: Medium speed <Middle speed>
	  [M3]: Low speed <Slow speed>
	  • If you do not specify anything here, the loader will operate at the high speed [M1]: High speed <Fast speed> setting.
	
	Press the [Start] button, and the loader starts the operation.
	If the loader has not been initialized, initialization starts.
	①Raises the F-arm (Lower limit → Upper limit). ②Lowers the F-arm (Upper limit → Middle point).
	③Lowers the F-arm (Middle point → Lower limit).
	The loader then repeats steps ① to ③.
	
	• Press the [Start] button to pause the operation at the break point.
	• The speed can be changed during the pause.
	• When an error occurs, the loader displays the same error code as in the regular operation, and then stops.
	• Press the [Quit] button, and the F-arm returns to its initial position and the loader stops the operation.

⚠ CAUTION	**Do not continue the operation for longer than 5 minutes.** **Wait for longer than one minute before restarting the operation.**

No. 9 F-arm horizontal movement check	<F-arm horizontal movement check> This program can be used to check the F-arm horizontal movement. Press the [Start] button. Select the item to adjust using the menu buttons on the liquid crystal panel. [M1]：Move in reciprocation continuously at the upper limit after the F-arm is raised <Upper height> [M2]：Move continuously at the same height as that in normal transfer after the F-arm is raised <Normal height> ┌───┐ │ ⚠ CAUTION **Do not continue the operation for longer than 5 minutes.** │ **Wait for longer than one minute before restarting the operation.** │ └───┘ [M1]：Move in reciprocation continuously at the upper limit after the F-arm is raised <Upper height> Press the [Start] button. Select the operation speed using the menu buttons on the liquid crystal panel. 　[M1]: High speed <Fast speed>　　[M2]: Medium speed <Middle speed> 　[M3]: Low speed <Slow speed> 　• If you do not specify anything here, the loader will operate at the high speed [M1]: High speed 　　<Fast speed> setting. Press the [Start] button, and the loader starts the operation. If the loader has not been initialized, initialization starts. ①Raises the F-arm ②Move the F-arm horizontally (Horizontal middle point position → Macro position) ③Move the F-arm horizontally (Macro position → Stage position) ④Move the F-arm horizontally (Stage position → Macro position) The loader then repeats steps ① to ④. • Press the [Start] button to pause the operation at the break point. • The speed can be changed during the pause. • When an error occurs, the loader displays the same error code as in the regular operation, and then stops. • The above operation pattern indicates the F1-arm (upper side) operation. • Press the [Quit] button, and the F-arm returns to its initial position and the loader stops the operation.

[M2]：Move continuously at the same height as that in normal transfer after the F-arm is raised <Normal height>

Press the [Start] button.
Select the operation speed using the menu buttons on the liquid crystal panel.
  [M1]: High speed <Fast speed>   [M2]: Medium speed <Middle speed>
  [M3]: Low speed <Slow speed>
    • If you do not specify anything here, the loader will operate at the high speed [M1]: High speed <Fast speed> setting.

Press the [Start] button, and the loader starts the operation.
If the loader has not been initialized, initialization starts.
①Move the F-arm horizontally (Horizontal middle point position → Macro position)
②Raises the F-arm (Lower limit → Upper limit)
③Move the F-arm horizontally (Macro position → Stage position)
④Lowers the F-arm (Upper limit → Middle point)
⑤Move the F-arm horizontally (Stage position → Horizontal middle point position)
⑥Lowers the F-arm (Middle point → Lower limit)
The loader then repeats steps ① to ⑥.

・Press the [Start] button to pause the operation at the break point.
・The speed can be changed during the pause.
・When an error occurs, the loader displays the same error code as in the regular operation, and then stops.
・The above operation pattern indicates the F1-arm (upper side) operation.
・Press the [Quit] button, and the F-arm returns to its initial position and the loader stops the operation.

No. 10
Centering
sensor count
check
	<Centering sensor count check>
	This program can be used to check the centering sensor count state.
	
	Press the [Start] button.
	① Initialized.
	② Press the interlock switch and the [Start] button.
	③ FOUP Door open.
	④ When the door opens completely, release your hand from the interlock switch and press the [Start] button. (② to ④ are for AL120-LMB12-LP3 only.）
	⑤ Raises the A-arm and turns the horizontal drive motor OFF.
	⑥ Set a wafer on the A-arm so that it is in virtually the same position as during transfer.
	⑦ Press the [M2] button <Vacuum valve change> to hold the wafer.
	⑧ Press the [M3] button<Search>, and press the[START] button.
	  The A-arm moves horizontally and the value detected by the centering sensor is displayed on the liquid crystal panel.
	
	The following four items are displayed:
	S1:#1 Displacement of the detected position toward the front of the sensor [um],
	     displacement of the detected position toward the back of the sensor [um]
	S2:#2 Displacement of the detected position toward the front of the sensor [um],
	     displacement of the detected position toward the back of the sensor [um]
	S3:#3 Displacement of the detected position toward the front of the sensor [um],
	     displacement of the detected position toward the back of the sensor [um]
	S4:#4 Displacement of the detected position toward the front of the sensor [um],
	     displacement of the detected position toward the back of the sensor [um]
	#3 and #4 are displayed only on the AL120-6, not displayed on other models.

The centering sensor detection state is indicated by the LED ON/OFF state of the Wafer No. selector button.

#1 centering sensor detection ON:OFF

#2 centering sensor detection ON:OFF

#3 centering sensor detection ON:OFF

#4 centering sensor detection ON:OFF

- Press the [M3] button, and turns the horizontal drive motor OFF.
- If the cassette is installed on the cassette installation part, the operation does not start.
- Press the 4-way button [RIGHT] to start initialization in the horizontal direction of the A-arm.
- When an error occurs, the loader displays the same error code as in the regular operation, and then stops.
- Press the [Quit] button, the A-arm returns to its initial position. Then, if you press the [Start] button or the [Quit] button while pressing the interlock switch of the FOUP opener, the FOUP door closes and the loader stops the operation. (AL120-LMB12-LP3 only) and the A-arm return to their initial positions, and the loader stops the operation.
  Vacuum turns OFF automatically.

No. 11 Wafer mapping sensor height check	<Mapping parameter check> This program can be used to adjust the mapping sensor. Press the [Start] button, and select the item to adjust by using the menu buttons on the liquid crystal panel. [M1]: Automatically adjust mapping parameters <Mapping auto adjust> [M2]: Execute mapping and display results <Mapping result display> [M3]: Manually input mapping parameters <Input parameter> [M4]: Check the origin position <Origin sensor check>
*Applicable to AL120-LMB12-F only	[M1]: Automatically adjust mapping parameters <Mapping auto adjust> The mapping parameters can be adjusted automatically. Using the 4-way button, select the number of the wafer type to adjust or register from the list of wafer type numbers displayed on the liquid crystal panel, and then press the [Start] button. ①□Insert the wafers to be set into the lowest and highest slots of a cassette. ②□Press the [M1] button. The mapping is executed. If the loader displays that the mapping data is <Result>: OK, press the [M2] button to register the data. [M1]: Execute the automatic mapping adjustment <Adjust mapping> [M2]: Register the results of automatic mapping adjustment <Save>
	[M2]: Execute mapping and display results <Mapping result display> This program can be used to check for normal detection when mapping is executed based on the registered data. [M1]: Execute mapping <Mapping> [M2]: Display mapping results <Display result>
	[M1]: Execute mapping <Mapping> Using the 4-way button, select the number of the wafer type to adjust or register from the list of wafer type numbers displayed on the liquid crystal panel, and then press the [Start] button. ①□Insert all wafers to be confirmed into the cassette. ②□Press the [M1] button. The mapping is executed.
	[M2]: Display mapping results <Display result> ①□Press the [M2] buttons to display the results on the liquid crystal panel. The results displayed include the results of judgments for each slot (Pass/Fail), center position of a wafer <P>, and wafer thickness <Thick>. [M1]: Next page <PageUp> [M2]: Previous page <PageDn> [M3]: Terminate display <Exit>

[M3]: Manual input of mapping parameters <Input parameter>
This program can be used to modify mapping parameters.

Using the 4-way button, select the number of the wafer type to modify from the list of wafer type numbers displayed on the liquid crystal panel, and then press the [Start] button.

①□Parameter setting items are displayed on the liquid crystal panel.
Select the parameter to change with the 4-way button.

[M1]: Switching between mapping sensors 1, 2, and 3
[M2]: Save <Save>
[M3]: Delete<Back space>
[M4]: Terminate display <Exit>
[No.1 to No.9]: Input numbers 1 to 9. [No.10]: Input 0.
[No.21]: Input -. (To be used only for the offset start position)
4-way buttons [RIGHT] and [LEFT]: Move the cursor.
4-way buttons [UP] and [DOWN]: Move from one item to another.

Settable parameters
Item...Set value ....Default
・□Number of cassette slots
<Slot>...:25/26 25
・□Slot pitch
<Pitch>...:6350/10000 10000
・□Upper limit of wafer position error
<Upper> ....:10 to 3000 1500
・□Lower limit of wafer position error
<Lower> ....:10 to 3000 1500
・□Upper-limit value of wafer thickness
<Thick Upper>..................................:90 to 5000 1250
・□Lower-limit value of wafer thickness
<Thick Lower>..................................:90 to 400 250
・□Start position
<Start Position>..36500

②□Select an item using the 4-way buttons and input a value using the wafer No. buttons.
③□To register the modified values, press [M2]: Save <Save>.
To terminate the program without modification, press [M4]: Terminate display <Exit>.

[M4]：Origin check <Origin sensor check >
　①This program is used to check the sensor detection status by moving the wafer sensor vertically.
　[M1]：Initialize
　[M2]：Excitation OFF
　The origin sensor status is displayed in Wafer No.
　[No.1]：Origin sensor detection ON:OFF

　•　Press the [Quit] button, and the loader executes initialization and stops the operation.

No. 11 FOUP Opener mapping parameter setting *Applicable to AL120-LMB1 2-LP3 only	**\<Mapping parameter check\>** This program can be used to check and adjust the mapping. Press the [Start] button, and select the item to adjust by using the menu buttons on the liquid crystal panel. [M1]**:** Automatically adjust mapping parameters \<Mapping auto adjust\> [M2]**:** Execute mapping and display results \<Mapping result display\> [M3]**:** Manually input mapping parameters \<Input parameter\>
	[M1]: Automatically adjust mapping parameters \<Mapping auto adjust\> The mapping parameters can be adjusted automatically. Using the 4-way button, select the number of the wafer type to adjust or register from the list of wafer type numbers displayed on the liquid crystal panel, and then press the [Start] button. ① Insert the wafers to set into the lowest slot and the highest slot of the cassette. and place the cassette on the cassette installation part. ② Press the [M1] button, and press [START] button. The mapping is executed. If the loader displays that the mapping data is \<Result\>: OK, press the [M2] button to register the data. [M1]: Execute the automatic mapping adjustment \<Adjust mapping\> [M2]: Register the results of automatic mapping adjustment \<Save\> [M3]：Read default value from FOUP opener. \<Load default parameter of FOUP opener\> [M4]: Write default value to FOUP opener. \<Set default parameter of FOUP opener\> * This test stores the standard values of the thickness, thickness tolerance and mapping start position used for mapping the FOUP Opener. The mapping of the wafer to be set as the standard is executed and the acquired value is set as the standard value. * The position tolerance is fixed to 1.3mm. The thickness tolerance is 70% of the wafer thickness acquired from FOUP Opener.
	[M2]: Execute mapping and display results \<Mapping result display\> This program can be used to check for normal detection when mapping is executed based on the registered data. Using the 4-way button, select the number of the wafer type to adjust or register from the list of wafer type numbers displayed on the liquid crystal panel, and then press the [Start] button. [M1]: Execute mapping \<Mapping\> [M2]: Display results of mapping sensor \<Display result \>
	[M1]: Execute mapping \<Mapping\> ①□Insert all wafers to be confirmed into the cassette. and place the cassette on the cassette installation part. ②□Press the [M1] button. The mapping is executed. [M2]: Display mapping results \<Display result\> ①□Press the [M2] buttons to display the results on the liquid crystal panel. The results displayed include the results of judgments for each slot (Pass/Fail), center position of a wafer \<P\>, and wafer thickness \<Thick\>. [M1]: Next page \<PageUp\> [M2]: Previous page \<PageDn\> [M3]: Terminate display \<Exit\>

[M3]: Manual input of mapping parameters <Input parameter>
This program can be used to modify mapping parameters.

Using the 4-way button, select the number of the wafer type to modify from the list of wafer type numbers displayed on the liquid crystal panel, and then press the [Start] button.

①□Parameter setting items are displayed on the liquid crystal panel.
Select the parameter to change with the 4-way button.

[M2]: Save <Save>
[M3]: Delete<Back space>
[M4]: Terminate display <Exit>
[No.1 to No.9]: Input numbers 1 to 9. [No.10]: Input 0.
[No.21]: Input -. (To be used only for the offset start position)
4-way buttons [RIGHT] and [LEFT]: Move the cursor.
4-way buttons [UP] and [DOWN]: Move from one item to another

Settable parameters
Item...Set value ....Default
・□Number of cassette slots
<Slot>..:25/26 25
・□Slot pitch
<Pitch>...:6350/10000 10000
・□Upper limit of wafer position error
<Upper> ....:10 to 3000...............1500
・□Lower limit of wafer position error
<Lower> ....:10 to 3000...............1500
・□Upper-limit value of wafer thickness
<Thick Upper>..................................:90 to 5000.............1250
・□Lower-limit value of wafer thickness
<Thick Lower>..................................:90 to 400...............250
・□Start position
<Start Position>...36500

②□Select an item using the 4-way buttons and input a value using the wafer No. buttons.
③□To register the modified values, press [M2]: Save <Save>.
To terminate the program without modification, press [M4]: Terminate display <Exit>.

No. 12 A-arm insertion height check and vertical movement check	**\<A-arm insertion height check\>**
	This program can be used to check and adjust the A-arm insertion height.
	Press the [Start] button.
	Select the item to adjust using the menu buttons on the liquid crystal panel.
	[M1]: Check the empty arm insertion height and the vacuum fine-adjustment value \<A-arm insertion height adjustment\>
	[M2]: Check the upper and lower limit positions \<M2:Upper/Lower limit position check\>

[M1]: Check the empty arm insertion height and the vacuum fine-adjustment value \<A-arm insertion height adjustment\>

①Insert the wafer to set into the cassette slot. (Initially, insert the wafer into the 12th, 13th or 14th slot from the bottom.)
②Place the cassette on the cassette installation part.
③Using the 4-way buttons, select the Wafer Type No. to be adjusted or registered from Wafer Type No. List displayed on the liquid crystal panel. Then, press the [Start] button.
If the loader has not been initialized, initialization starts.
The mapping is executed.
④Using the Wafer No. selector button, specify the slot to which the wafer for adjustment was inserted. (Initially, specify 13.)
⑤Press the [Start] button.
⑥The A-arm moves up and the horizontal excitation turns OFF.
⑦Manually insert the A-arm into the cassette.

You can select an operation from the menu buttons on the liquid crystal panel to then confirm or adjust the settings.
[M1]: Turn the vacuum ON for the A-arm \<Vacuum ON OFF\>
[M2]: Move the height of the cassette installation part to the removal height or the arm insertion height alternately. \<Put a wafer on a A-arm\>
[M3]: Register \<Save\>
[M4]: Specify a different slot \<Change slot\>

⑧Confirm the arm insertion height or make fine adjustments. A-arm movement can be selected by using the 4-way button on the liquid crystal panel.
[UP]: Raise the A-arm slightly \<UP: A-arm 0.1 mm UP\>
[DOWN]: Lower the A-arm slightly \<DOWN: A-arm 0.1 mm DOWN\>
⑨Register the adjusted value.
[M3]: Register \<Save\>
⑩Confirm the wafer removal height or make fine adjustments.
Move the A-arm using the menu button on the liquid crystal panel.
Press the [M1] button to turn ON the A-arm vacuum. \<Vacuum\>
Press the [M2] button \<Put a wafer on a A-arm\> to move the A-arm to the wafer insertion height.
The A-arm movement can be selected using the 4-way buttons on the liquid crystal panel.
[UP]: Raises the A-arm finely \< UP: A-arm 0.1mm UP \>
[DOWN]: Lowers the A-arm finely \< DOWN: A-arm 0.1mm DOWN \>
⑪Register the adjusted value.
[M3]: Register \<Save\>

⑫When a wafer is chucked by the vacuum, press the [M1] button to turn the vacuum OFF for the A-arm.
⑬Press the [M2] button \<Put a wafer on A-arm\> to raise the elevator to the A-arm insertion height.

・When the [Quit] button is pressed, wafer removal height adjustments are finished and each part is initialized
・When the [M4] button is pressed, and you are brought back to ③and can specify a different slot.
For the 2nd and 25th wafer, confirm by performing the steps ③through⑧ , and ⑩ and ⑫

Reference:

    Standard position：

    Empty arm insertion height： 2mm below wafer

    Vacuum fine-adjustment value： 6mm

[M2]：Check upper and lower limit positions <M2:Upper/Lower limit position check>

This program can be used to check the sensor detection status by moving the A-arm vertically.

If the loader has not been initialized, initialization starts.

    [M1]：Raise 20 mm

    [M2]：Raise all stokes by defined values.

    [M3]：Initialize the A-arm.

    [M4]：Excitation: OFF

    The origin sensor status is displayed in Wafer No.

    [No.1]：Detect the origin sensor: ON:OFF

    • Press the [Quit] button, and the loader executes initialization and stops the operation.

| No. 13
A-arm origin in backward/forward and side-to-side direction check | **<A-arm origin sensor check>**
This program can be used to check and adjust the A-arm height.

Press the [Start] button.
Select the item to adjust using the menu buttons on the liquid crystal panel.
[M1]：Check the origin in backward/forward direction <A-arm backward/forward>
[M2]：Check the origin in side-to-side direction <A-arm side-to-side>

⚠ CAUTION   **Do not continue the operation for longer than 5 minutes.**
Wait for longer than one minute before restarting the operation. |

[M1]：Check the origin in backward/forward direction   <A-arm backward/forward>

If the loader has not been initialized, initialization starts.

①Move the A-arm to the first wafer insertion height.

    4-way button [Right]：Move backward by one pulse.

    4-way button [Left]：　Move forward by one pulse

    [M1]：Initialize

    [M2]：Move forward by 10 mm

    [M3]：Move backward by 10 mm

    [M4]：Excitation ON/OFF

    The sensor status is displayed on Wafer No.

    [No.1]：Origin sensor detection ON:OFF

    • Press the [Quit] button, and the loader executes initialization and stops the operation.

	[M2]：Check the origin in side-to-side direction <A-arm side-to-side> If the loader has not been initialized, initialization starts. ①Move the A-arm to the first wafer insertion height. 　[M1]：Initialize 　[M2]：Move to left side by 1 mm 　[M3]：Move to right side by 1 mm 　[M4]：Excitation ON/OFF 　The sensor status is displayed on Wafer No. 　[No.1]：Origin sensor detection ON:OFF 　• Press the [Quit] button, and the loader executes initialization and stops the operation.
No. 14 Centering transfer position check	<Centering adjustment> This program can be used to check and adjust the centering position for each wafer diameter. Press the [Start] button. ① Insert the wafers into any slot of a cassette. ② Using the 4-way button, select the number of wafer type to adjust or register from the list of wafer type numbers displayed on the liquid crystal panel, and then press the [Start] button. (Registration is done for each wafer diameter. Registration for each wafer thickness is not available.) ③ Mapping is performed and the [Wafer No.] button for a slot in which there is a wafer blinks. Press the [Wafer No.] button to specify the slot into which the wafer to be adjusted has been inserted. The [Wafer No.] button for the selected slot stops blinking and stays lit. ④ Press the [Start] button. ⑤ The selected wafer is loaded from the cassette. After centering is performed, the wafer continues spinning on the center table. Note: 　The voltage of the orientation flat sensor by every 90 degrees is displayed on the liquid crystal panel and the wafer decentering status can be checked. ⑥ Using the 4-way button, correct the centering position. The correction value can be set in 0.06 mm intervals. Stop the center table rotation before making corrections. [Start]: Pause the rotation 4-way button [UP]　　　　　　　　　: Far side <Far> 4-way button [DOWN]　　　　　　　　: Near side <Near> 4-way button [LEFT]　　　　　　　　 : Left <LEFT> 4-way button [RIGHT]　　　　　　　　: Right <RIGHT> ⑦ Register the correction value. 　[M1]: Register <Save> 　The registered correction data is saved in the internal memory. 　After the data is put in the internal memory, the notched is adjusted, the wafer is loaded into the cassette, and you are brought back to the step ⑤. • Display and registration are effective when the center table rotation is stopped. • When the [Quit] button is pressed, the notched is adjusted and the wafer is loaded into the cassette. The notched must be at the 45-degree position toward the front. • If you do not press [M1] button but press the [Quit] button instead, the wafer is unloaded into the cassette without saving the data. • [M4]：Excitation ON/OFF

No. 15 Notch alignment adjustment	<Notch alignment adjustment> This program can be used to check and adjust the notch positions f. ① Insert a wafer into any slot of a cassette. and place the cassette on the cassette installation part. ② Using the 4-way button, select the number of wafer type to adjust or register from the list of wafer type numbers displayed on the liquid crystal panel, and then press the [Start] button. (Registration is done for each wafer diameter. Registration for each wafer thickness is not available.) ③ Mapping is performed and the [Wafer No.] button for a slot in which there is a wafer blinks. Press the [Wafer No.] button to specify the slot into which the wafer to be adjusted has been inserted. The [Wafer No.] button for the selected slot stops blinking and stays lit. ④ Press the [Start] button. ⑤ The selected wafer is loaded from the cassette. ⑥ Adjust the notch positions. Data saved in the internal memory is displayed on the liquid crystal panel. <CW/CCW 00> ⑦ Set the notch position setting knob in the direction you want to adjust the notch alignment. ⑧ Correct the notch alignment position. Save the correction data in the internal memory. Use the 4-way button to correct the position. 4-way button [RIGHT]: Clockwise 4-way button [LEFT]: Counterclockwise One pulse: About 0.1 degree ⑨ Register the correction value. [M1]: Register <Save> ⑩ Press the [Start] button to repeat steps ⑥ to ⑧. • If you do not press [M1] button but press the [Quit] button instead, the wafer is unloaded into the cassette without saving the data. • Use the [Wafer alignment] control for adjusting the orientation flat positions. • Correction data must be registered separately for each direction of notch. • [M3] : Unload • [M4] : Load
No. 16 L-arm rotation origin sensor position check	**< L-arm rotation origin sensor check >** This program can be used to check and adjust the L-arm rotation origin. Press the [Start] button. Select the item to adjust using the menu buttons on the liquid crystal panel. [M1] : Check the L-arm rotation origin sensor <L-arm rotation check> [M2] : Check the L-arm wafer support unit <L-arm wafer support unit check>

[M1]：Check the L-arm rotation <L-arm rotation check>

This program can be used to check the back-side arm rotation origin sensor.

Confirm that there is nothing interfering with the arm.

If the loader has not been initialized, initialization starts.

① The sensor detection state can be checked by the step-operation of the L-arm rotation motor.

• Specify the motor operation using the menu buttons on the operation panel display and the 4-way button.

4-way button [UP]: Rotate forward by 30 degrees <Forward 30>

4-way button [DOWN]: Rotate backward by 30 degrees <Backward 30>

[M1]: Initialize the L-arm <L rotation initialize>

[M2]: Switch between excitation ON and OFF <Current ON/OFF>

[M3]: Rotate by 90 degrees <Forward 90>

• The sensor state is indicated by the Wafer No. selector button.

 The LED on the Wafer No. selector button lights up on the detection of the sensor.

[No. 1]: Origin sensor detection

• Press the [Quit] button, and the L-arm returns to its initial position and the loader stops the operation.

⚠ CAUTION	**Do not continue the operation for longer than 5 minutes.** **Wait for longer than one minute before restarting the operation.**

[M2]: Check the L-arm wafer support unitL <L-arm wafer support unit check>

①Set the cassette that contains the wafer.

②Using the 4-way button, select the number of wafer type to adjust or register from the list of wafer type numbers displayed on the liquid crystal panel, and then press the [Start] button.

 If the loader has not been initialized, initialization starts.

③Mapping is performed and the [Wafer No.] button for a slot in which there is a wafer blinks.

 Use the [Wafer No.] button to specify the slot where the wafer to be adjusted is inserted.

 The [Wafer No.] button of the selected slot stops blinking and turns ON.

④Press the [Start] button.

⑤The wafer is loaded from the cassette. After the centering is performed, the L-arm moves to the upper limit position and then moves horizontally.

⑥Press the start switch, and the L-arm vacuum is canceled.

⑦Press the start switch, and the wafer moves to the Macro table and keeps rotating in increment of 90 degrees.

⑧Press [Start] switch or [Quit] switch, and the loader unloads the wafer to the cassette and stops operation.

No. 17
F-arm horizontal origin sensor position check

< F-arm horizontal origin sensor check >

This program can be used to check the horizontal origin sensor position.

Press the [Start] button.

If the loader has not been initialized, initialization starts.

Select the item to adjust using the menu buttons on the liquid crystal panel.

①The F-arm rises.

 4-way button [Right]：0.25mm Move to the stage side

 4-way button [Left]：0.25mm Move to the A-arm side

[M1]：Initialize

[M2]：Move all strokes horizontally

[M3]：Move the half stroke horizontally

[M4]：Excitation ON/OFF

The sensor status is displayed on Wafer No.

[No.1]：Detect the macro side sensor

[No.3]：Detect the horizontal middle point

[No.5]：Detect the stage side sensor

• Press the [Quit] button, and the loader executes initialization and stops the operation.

⚠ CAUTION   **Do not continue the operation for longer than 5 minutes.**
             Wait for longer than one minute before restarting the operation.

| No. 18 Vacuum switch check | <Vacuum switch check>
This program can be used to turn each vacuum electromagnetic valve ON/OFF and check the ON/OFF state of the corresponding vacuum switch.

Press the [Start] button.
If the loader has not been initialized, initialization starts.
Select the electromagnetic valve to turn ON/OFF by using the Wafer No. selector buttons.

The arm height is changed each time the menu button on the liquid crystal panel is pressed.
Select a menu button ([M1] or [M2]) and press the [Start] button to being operation.
[M1]: Change the up/down position of the A-arm <A-arm change position>
[M2]: Change the L-arm position <L-arm change position>
[M3]：Change the F-arm position -arm

・Showing the vacuum switch ON/OFF state <Switch display>
The ON/OFF state of the vacuum switch that corresponds to the selected electromagnetic valve is indicated on the Wafer No. selector button.
When the vacuum switch is ON, the LED on the Wafer No. selector button lights up.
[No. 1]: A-arm <A>   [No. 2]: Center table <M>
[No. 3]: L-arm <L>   [No. 4]: F-arm #1 <F1>
[No. 5]: F-arm #2 <F2>   [No. 6]: Stage <S>

Turning the electromagnetic valve ON/OFF <Valve switching>
When the selected electromagnetic valve is ON, the LED on the Wafer No. selector button lights up.
[No. 11]: A-arm <A>   [No. 12]: Center table <M>
[No. 13]: L-arm <L>   [No. 14]: F-arm #1 <F1>
[No. 15]: F-arm #2 <F2>   [No. 16]: Stage <S>

Turning the vacuum switch buzzer ON/OFF <buzzer switching>
The buzzer keeps sounding as long as the LED on the Wafer No. selector button is lit and the vacuum switch is ON.
[No. 21]: A-arm <A>   [No. 22]: Center table <M>
[No. 23]: L-arm <L>   [No. 24]: F-arm #1 <F1>
[No. 25]: F-arm #2 <F2>   [No. 26]: Stage <S>

・When the [Quit] button is pressed, the arms return to their initial positions and the loader stops the operation. |

No. 19 Notch sensor and wafer sensor check	**<Notch sensor Mapping sensor check>** This program can be used to check the notch sensor and water sensor operation. Press the [Start] button. If the loader has not been initialized, initialization starts. Select the item to adjust using the menu buttons on the liquid crystal panel. [M1]:Check the notch sensor level <Notch sensor level check> [M2]:Check the wafer sensor <Wafer sensor check> *The check of the wafer sensor operation is available for AL120-LMB12-F only.
	[M1]:Check the notch sensor level <Notch sensor level check> Press the start switch. The voltage of the notch sensor level is displayed.
	[M2]:Check the wafer sensor <Wafer sensor check> (Applicable to AL120-LMB12-F only) Press the start switch. The wafer sensor moves to the first wafer insertion height. If the wafer sensor does not detect the target object, the buzzer is heard.
No. 20 Stage lock and observation window lock movement check	<Stage lock movement check> <Stage and window lock movement check> (AL120-LMB12-LP3) This program can be used to check the notch sensor and wafer sensor operations. Press the [Start] button. Select the item to adjust using the menu buttons on the liquid crystal panel. [M1]:Check the stage lock <Stage lock movement check> [M2]:Check the observation window lock movement <Window lock movement check> (Applicable to AL120-LMB12-LP3 only)
	[M1]:Check the stage lock <Stage lock movement check> Lock and Unlock is switched each time the start switch is pressed.
	[M2]:Check the observation window lock movement <Window lock movement check> Lock and Unlock is switched each time the start switch is pressed.
No. 21 LED lamp check	<LED lamp check> This program can be used to check that the LED lamps light up. Press the [Start] button. ・□All the LED lamps on the operation panel blink. (The buzzer sounds at the same time.) ・□The liquid crystal panel backlight blinks. ・□The stage transfer permission lamp (LED) blinks. ・□Press the [Quit] button, and the loader returns to its initial state and stops the operation.

No. 22 Button operation check	**\<Button motion check\>** This program can be used to check the operation button motions. Press the [Start] button. ・☐Press a button with an LED, and the LED lights up on the pressed button. ・☐Press the All/Sampling button, and all the LEDs light up. ・☐Press the menu buttons [M1] to [M4] on the liquid crystal panel, and [M1] to [M4] appear on the liquid crystal panel. ・☐When the 4-way button on the liquid crystal panel is pressed, [UP], [DOWN], [LEFT] or [RIGHT] corresponding to the button pressed is displayed on the liquid crystal panel. ・☐When the [wafer alignment] control is manipulated, [Top], [Right], [Bottom] or [Left] corresponding to the set position is displayed on the liquid crystal panel. ・☐When the [Inspection time] control is manipulated, the inspection time corresponding to the set inspection time is displayed on the liquid crystal panel. ・☐When the [Top macro spin direction control] is manipulated, [CCW], [Cancel] or [CW] corresponding to the set rotation is displayed on the liquid crystal panel. ・☐ When the remote control buttons are manipulated, [Remote start], [Remote Unload], [Remote Micro] or [Remote Macro] corresponding to the settings is displayed on the liquid crystal panel. ・☐Press the [Quit] button, and the loader returns to its initial state and stops the operation.

No. 23 Sensor and button check	**\<Sensor and button input check\>** This program can be used to check the sensor input states. Press the [Start] button. ・☐The LEDs on the Wafer No. selector buttons light up in accordance with the sensor input states. ・☐The list of sensors is displayed on the liquid crystal panel. ・☐Use the menu buttons [M1], [M2] [M3]and [M4] to switch the sensors to check. ・☐Press the [Quit] button, and the loader returns to its initial state and stops the operation.

	M1	M2	M3	M4
1	A front/back cassette position sensor \<AL cst\> U205	AL120-LMB12-F lower-limit sensor \<E low\> U104	E step-out sensor \<E out2\> U105	
2	A front/back standby position sensor \<AL mid\> U206	Horizontal origin sensor \<E limit\> U101	E step-out sensor \<E out1\> U106	
3	A front/back macro position sensor \<AL macro\> U207	Horizontal mapping position sensor \<E map\> U102	A step-out sensor \<A out2\> U019	
4	A vertical upper-limit sensor \<A up\> U201	Horizontal stop position sensor\<E out\> U103	A step-out sensor #2 \<A out1\> U019	
5	A vertical transfer position sensor \<A mid\> U202	L-arm rotation origin sensor ＜L rotate\> S101	-	
6	A vertical lower-limit sensor \<A low\> U203	L vertical upper-limit sensor \<L up\> S101		
7	A side-to-side origin sensor \<A LR org\> U208	L vertical transfer position sensor \<L mid\>		
8		L vertical lower-limit sensor \<L low\>	Macro table rotation motor driver MO \<M MO\>	
9		Cassette switch #1 \<Caseet\> S101	Macro table rotation motor driver TSD \<M TSD\>	
10		Cassette switch #1 \<Caseet\> S102	A-arm rotation motor driver MO \<AR MO\>	
11		Cassette switch #1 \<Caseet\> S103	A-arm rotation motor driver TSD \<AR TSD\>	
12		Cassette switch #1 \<Caseet\> S104	A-arm horizontal motor driver MO \<AL MO\>	
13			A-arm horizontal motor driver TSD \<AL TSD\>	
14		Window open/close sensor \<W close\>U701	A-arm vertical motor driver MO \<AUP MO\>	
15		Window lock \<WL close\> U702	A-arm vertical motor driver TSD \<AUP TSD\>	
16		Window unlock \<WL open\> U703		
17	F horizontal macro position sensor \<FL macro\> U505	L reverse rotation switch \<L SW BK\>		
18	F horizontal middle position sensor \<FL mid\>U506	L rotation switch \<L SW FOR\>		
19	F horizontal stage position sensor \<FL stage\> U507	L position registration switch \<L set1\>		
20	F vertical upper-limit sensor \<F up\> U501			
21	F vertical middle point sensor \<F mid\>U502	Macro table upper-limit sensor \<M up\>	L-arm rotation motor driver MO \<L MO\>	
22	F vertical lower-limit sensor \<F low\> U503	Macro table lower-limit sensor \<M low\>	L-arm rotation motor driver TSD \<L TSD\>	
23	\<FUP vcm\>		Wafer sensor vertical motor driver TSD \<E TSD\>	

24	Wafer out sensor <WafarOut>U109		Wafer sensor vertical motor driver MO <E MO>	
25				
26				

No. 24 Wafer type setting	<Wafer parameter setting>

<Wafer parameter setting>

This program can be used to register wafer types, and set and change the size, thickness and transfer speed for each wafer type.

Press the [Start] button.
The registered wafer types are displayed on the liquid crystal panel.
① Specify the item to modify or add, and press the 4-way button [RIGHT].
• Modify: Move the <×> to the item to modify by using the 4-way button.
• Add: Move the <×> to the item to add by using the 4-way button.
② Move to the setting item by using the 4-way button, and change the value by using the up and down buttons.
③ Move to the comment item by using the 4-way button, and changes into the comment input screen in the [M3] button <Edit>.

Settable items
• Wafer size <Size>   :300/---
  Normally, the wafer size can be set to any size appropriate for your wafer loading operation.
  Standard settings: 300
• When chose ---, the set point is deleted, and it is not displayed to a wafer type screen at the time of the inspection.

• Wafer thickness <Thick>   :775-500/500-200
* Wafer size and thickness settings may be unavailable, depending on the loader specifications.

• Transfer speed <Speed>   :Fast/Middle/Slow/SP1–SP5
  SP1 to SP5 can be set to desired speeds for each axis.
  Optional speed is limited as follows by wafer thickness <Thick>.
   775-500.........................:Fast/Middle/Slow/SP1～SP5   Normal setting<Fast>
   500-200.........................:Middle/Slow/SP1～SP5   Normal setting <Slow>

• Comment <Comment> -----------: A-Z, a-z, 1 to 0, space
  [M1]:Decision<OK>........   [M2]:Cancel<Cancel>
  [M3]:Back space<BkSpace> [M4]:Exchange<Change>
   Capital letter input... [No.1～No.26]:Input of A to Z
   Small letter input ..... [No.1～No.26]:Input of a to z
   Number input .... [No.1～No.9]:Input of 1 to 9, [No.10]:Input of 0, [No.11]:Input of ー, [No.12～No.26]:Input of space
  Capital letter input, small letter input, number input are replaced whenever they push [M4]:Exchange <Change>.
  Up to 16 characters can be entered.

4-way button [UP], [DOWN]: Change the set value of each item
4-way button [LEFT], [RIGHT]: Change the setting item
[M1]: Register <Save>
[M2]: Cancel <Cancel>
[M3]: Detailed settings
When the transfer speed <Speed> is set to SP1 to SP5, press [M3] button <Detail> to open the detailed setting screen.
When the Comment <Comment> is [M3] button <Edit> to open the comment input screen.

	• Transfer speed <Speed> SP1 to SP5 A-arm horizontal speed <A-arm linier speed> .... High speed <Fast> / Medium speed <Middle> / Low speed <Slow> A-arm vertical speed <A-arm up down speed> .... High speed <Fast> / Medium speed <Middle> / Low speed <Slow> L-arm rotation speed <L-arm rotation speed> .... High speed <Fast> / Medium speed <Middle> / Low speed <Slow> L-arm vertical speed <L-arm up down speed>............... High speed <Fast> / Medium speed <Middle> / Low speed <Slow> Macro table rotation speed <Macro table rotation speed> .... High speed <Fast> / Medium speed <Middle> / Low speed <Slow> Macro table vertical speed <Macro table up down speed>...... High speed <Fast> / Medium speed <Middle> / Low speed <Slow> F-arm horizontal speed <A-arm linier speed> .... High speed <Fast> / Medium speed <Middle> / Low speed <Slow> F-arm vertical speed <F-arm up down speed>............... High speed <Fast> / Medium speed <Middle> / Low speed <Slow>
No. 25 Wafer unloading position adjustment	<Retracted position adjustment> This program can be used to adjust the position where wafers are unloaded into the cassette to the near side (cassette opening side). This prevents unloaded wafers from hitting against the inside of the cassette. ①Insert wafers into any slot of a cassette, and set the cassette. ②Using the 4-way button, select the number of the wafer type to adjust from the list of wafer type numbers displayed on the liquid crystal panel, and then press the [Start] button. If the loader has not been initialized, initialization starts. ③The mapping is executed and the [Wafer No.] button of the slot that contains the wafer blinks. Use the [Wafer No.] button to specify the slot where the wafer to be adjusted is inserted. The [Wafer No.] button of the selected slot stops blinking and turns ON. ④Press the [Start] button to decide the wafer to be loaded. The correction value of the unloading position is displayed on the liquid crystal panel. ⑤Press the [M1] button to load the wafer. ⑥The wafer is unloaded into the cassette. ⑦If <Result>: OK is displayed, press the [M2] button to put the correction data into the internal memory. ⑧Press the [M1] button to repeat steps③and ⑤. ・□Press the [Quit] button to terminate the adjustment. ・□Before starting the test, insert wafers into the cassette and push them in until they stop. (If wafers are already inserted in the cassette, push them in until they stop.) Position the cassette toward the front as much as possible by taking care that it is inside the range of the cassette guide clearance. ・□Correctable range: 0 to 5 mm
No. 26 Software Version, error log display and operation settings	<Condition setting and Error log disp> This program can be used to set the loader operation, check the software version and set the time. Select the item to adjust using the menu buttons on the liquid crystal panel. [M1]：Set the loader operation <Loader settings> [M2]：Check the error log and software version.<Version and error log display>

[M1] Set the loader operation <Loader settings>
This program can be used for detailed loader settings.

Setting items are displayed on the liquid crystal panel.
Change the settings using the 4-way button.

Use the menu buttons on the liquid crystal panel for registration, cancellation, and page feed.
[M1]: Register <Save>
[M2]: Cancel <Cancel>
[M3]: Next page <PageUp>
[M4]: Previous page <PageDn>

Setting items .... [Default]

Setting item	Default
Number of rotations for notch alignment <Rotation of notcht>	1st rotation [1] / 2nd rotation [2]
Vacuum absorption before raising the A-arm in the cassette <Vacuum contact before A arm >	OFF [OFF] / ON [ON]
Use of multiple types of wafers <Wafer size>	Multiple [Multi] / Single [single]
Setting of sequence when power is turned on Top Macro <Top macro button>	ON [ON] / OFF [OFF]
Setting of sequence when power is turned on Back Macro <Back macro button>	ON [ON] / OFF [OFF]
Setting of sequence when power is turned on 2nd Back Macro <2nd back macro button>	ON [ON] / OFF [OFF]
Setting of sequence when power is turned on Microscope <Microscope button>	ON [ON] / OFF [OFF]
Setting of slot with which wafer transfer begins in a cassette <Start slot>	Bottom [Bottom] / Top [Top]
Numbering of wafers in a cassette <No. on wafers in cassette>	From bottom 1 [Bottom] / From top 1 [Top]
Registration of wafers unloaded during operation <Register wafer unloading>	ON [ON] / OFF [OFF]
Return to origin when power is turned on <Initialize>	Automatic [Auto] / Standby [Manual]
Start activated by the stage sensor <Stage set start>	ON [ON] / OFF [OFF]
Use of the vacuum stage <Vacuum stage>	Used [Used] / Not used [Not used]
Select the wafer type when the test is finished ＜Wafer selection when ends＞	keep [Keep] / Release [Release]
Assign the window open/close sensor to the start switch < Window set start>	OFF [OFF]] / ON [ON]
Buzzer at the end of the F-arm down movement <A buzzer when F-arm is down>	OFF [OFF]] / ON [ON
Source pressure sensor <Main vacuum sensor>	Not used [Not used] / Used [Used]

・Press the [M1]: Register <Save> button to register settings and terminate the setting operation.
Press [M2] button to quit without making corrections: Cancel <Cancel>
・In the above described items, items for optional parts are included.
Some of the above described items may not be enabled, although they are selected and enabled, depending on the specifications of your loader unit.

[M2]：Check the error log and software version.<Version and error log display>

This program can be used to check the software version and the history of error occurrences

The software version or error log displayed can be cleared and the error log date can be set by manipulating the menu buttons on the liquid crystal panel.
[M1]: Clear <Clear>
[M2]: Set date <Date>
[M3]: Go to the previous page <PageUp>
[M4]: Go to the next page <PageDn>
Move the cursor using the 4-way buttons [UP], [DOWN], [RIGHT] and [LEFT].

① Press the [Start] button.
    The software version and error log are displayed on the liquid crystal panel.
    [M1]: Press the <Clear> button and then the [Start] button to delete the error log

Software version <Ver.>: V01.01 V01.01
Error code display:
  Error code <Code>: Refer to the Operation Manual for error code details.
  Sequence in which the error occurred <Seq>: Number of the sequence in which the error occurred
  Step in which the error occurred <Step>: Number of the step in which the error occurred
  Date and time of error occurrence <Date><Time>

・ The first segment of Software version indicates version of the M-CPU board and the second segment
   indicates version of the S-CPU board.
・ Press the[Quit] button to quit this program.
・ Up to ten errors are recorded in the error log.
・ Data is cleared after the loader has remained off for continuous two weeks.
・ If the date has been cleared, use [M2]: <Date> to set the date.

[M2]: Set date <Date>
① Parameters to be set are displayed on the liquid crystal panel.
    Select the parameters to be changed using the 4-way buttons.

[M2]: Save <Save>
[M3]: Delete <Back space>
[M4]: Exit the display <Exit>
[No.1 to No.9]: Input numbers 1 to 9
4-way buttons [RIGHT] and [LEFT]: Move the cursor.
4-way buttons [UP] and [DOWN]: Move between items.

Parameters that can be set:
• Year <Year>   the last two digits of a calendar year
• Month <Month>
• Date <Date>
• Hour <Hour>
• Minute <Minute>
• Second <Second>

② Select an item using the 4-way buttons, and input a value using the [Wafer No.] buttons.
③ After the item has been corrected, press [M2]: <Save> to register the corrected item.
    To quit the program without correcting the item, press [M4]: Exit the display <Exit>.

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4 Replacement of Consumables

Consult your nearest EVIDENT distributor for the inquiry about consumables.

Please give the distributor the product name and serial No.

The tools and accessories required are indicated with Tools and Accessories in this text. Tools are not included with this product.

Replacement cycles are indicated with **Replacement Cycle**.

The standard time required for replacement work is indicated with **Standard Working Time**.

⚠ CAUTION	**Be sure to turn the main switch OFF and unplug the power cord before replacing consumables.** **Use the right tool for the right accessory when assembling this product. If the tools are not used properly or this manual is not followed during assembly, parts may be damaged and product safety cannot be guaranteed.**

⚠ CAUTION	**If any noise occurs in the operation of a part, please contact your EVIDENT distributor.** **This loader uses specialized clean grease. Improper greasing may cause a malfunction.**

1 Macro (Center) Table: If a vacuum error has occurred or the table has become damaged
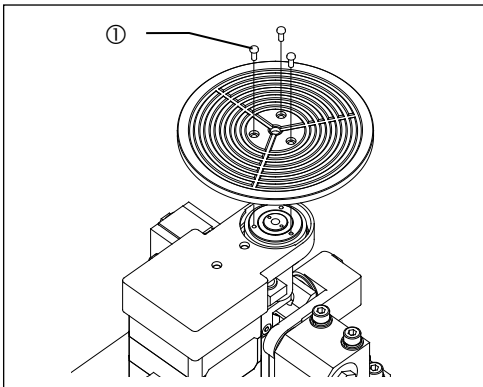
Tools Phillips-head screwdriver (No. 0)

Accessories M2 cross recessed pan head machine screws

1) Remove the three M2 cross recessed pan head machine screws ①and replace the macro (center) table.

Standard Working Time 10 minutes

2 Macro (Center) Table Oil Seal: If a vacuum error has occurred
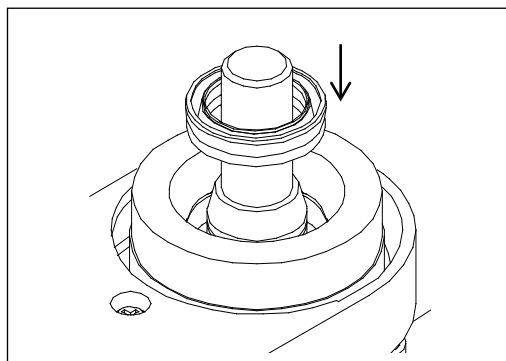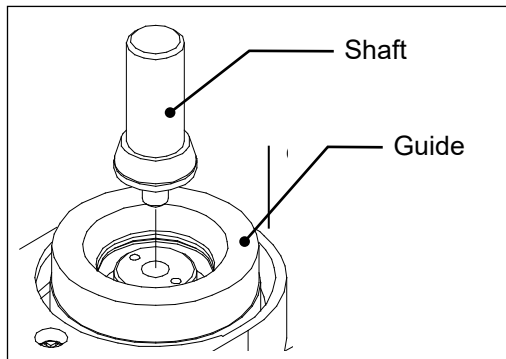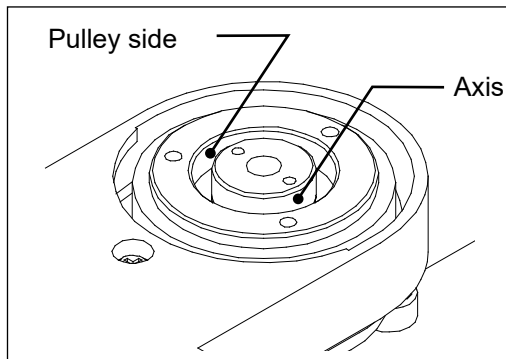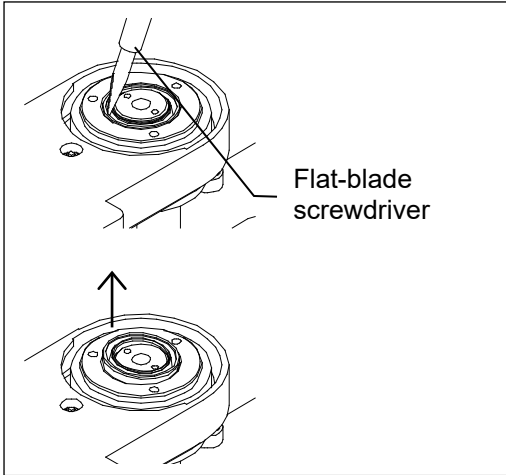
| Tools | Phillips-head screwdriver (No. 0)

Flat-blade screwdriver (No. 2.6-30)

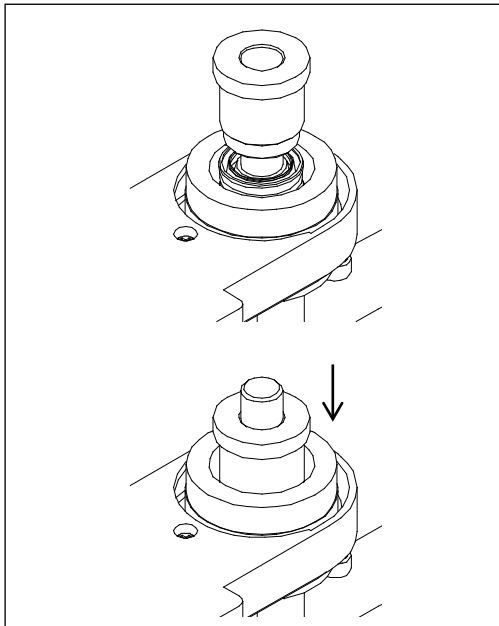Special oil seal mounting jig (guide, shaft and collar)

Clean wiper and absolute alcohol

Flat-blade screwdriver (image label)

1) Remove the three M2 cross recessed pan head machine screws using the Phillips-head screwdriver, and remove the macro (center) table.

2) Insert the flat-blade screwdriver into the oil seal groove. Remove the oil seal by lifting it from the outside (pulley side).

Pulley side / **Axis** (image labels)

3) Wind the clean wiper around the flat-blade screwdriver. Moisten it with commercially available absolute alcohol and clean the shaft and the pulley side.

| NOTICE | **Never put absolute alcohol near flames as it is highly flammable. Take care not to cause a spark by turning on/off electric appliances or fluorescent lamps.**

Shaft / **Guide** (image labels)

4) Attach the special jig for inserting the oil seal.

Set the guide to the stepped section on the top surface of the pulley.

5) Insert the shaft into the axis hole.

6) Drop a new oil seal into the guide, with the lip facing up.

7) Insert the collar into the shaft axis.

8) Insert the collar into the oil seal groove and push it down.
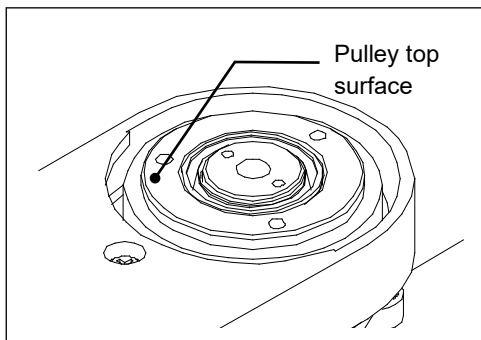
Pulley top surface

9) Remove the special oil seal mounting jig and check that the oil seal lip does not protrude from the pulley top surface.

10) After the check, attach the macro (center) table.

Replacement Cycle 5 years

Standard Working Time 20 minutes

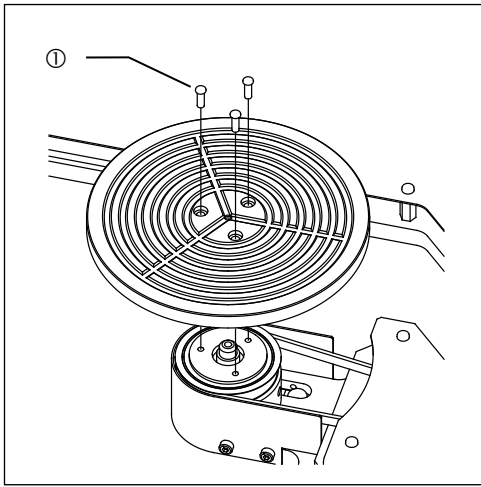## 3 A-arm: If a vacuum error has occurred or the A-arm vacuum pad has become damaged
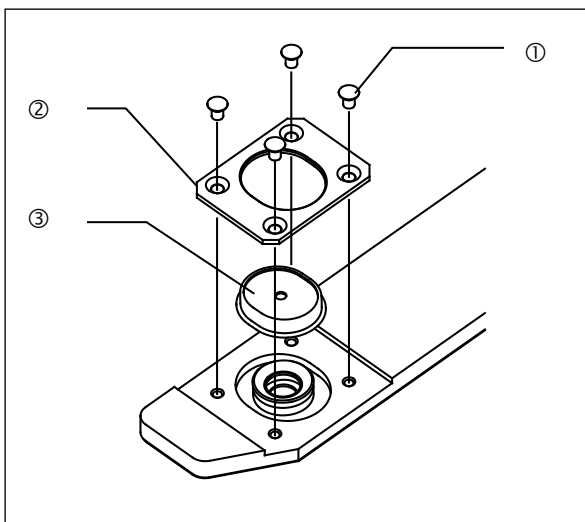
Tools Phillips-head screwdriver (No. 0)

1) Remove the M2 cross recessed pan head machine screws ①(four positions for one A-arm vacuum pad).

2) Remove the cover ② of the A-arm vacuum pad.

3) Replace the A-arm vacuum pad ③.

4) Attach the cover ② of the A-arm vacuum pad.

Standard Working Time 15 minutes

4 Vacuum Table: If a vacuum error has occurred or the table has become damaged

Tools   Phillips-head screwdriver (No. 0)

1)   Remove the three M2 cross recessed pan head machine screws ①, and replace the vacuum table.

Standard Working Time 10 minutes

## 5 Oil Seal for Vacuum Table: If a vacuum error has occurred
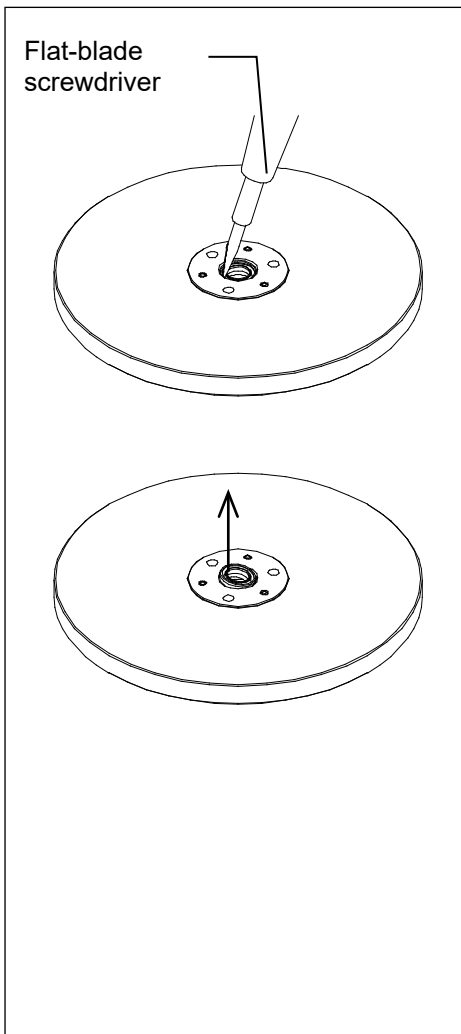
Flat-blade screwdriver

Tools   Phillips-head screwdriver (No. 0)

Flat-blade screwdriver (No. 2.6-30)

                Clean wiper and absolute alcohol

1)   Remove the three M2 cross recessed pan head machine screws using the Phillips-head screwdriver, and remove the vacuum table.

2)   Lay the vacuum table upside-down on a flat surface.

3)   Insert the flat-blade screwdriver into the oil seal groove. Remove the oil seal by lifting it from the outside.

Oil seal insertion part
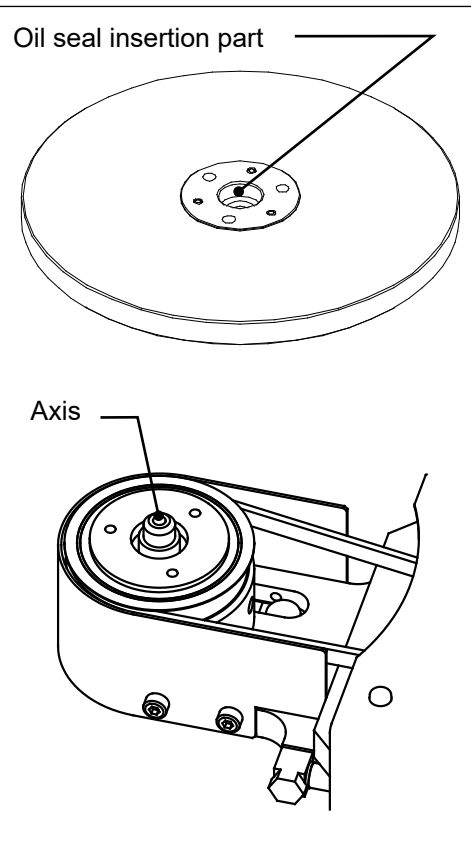
Axis

4) Wind the clean wiper around the flat-blade screwdriver. Moisten it with commercially available absolute alcohol and clean the oil seal insertion part of the vacuum table and the axis of the vacuum stage.

| NOTICE	Never put absolute alcohol near flames as it is highly flammable. Take care not to cause a spark by turning on/off electric appliances or fluorescent lamps.
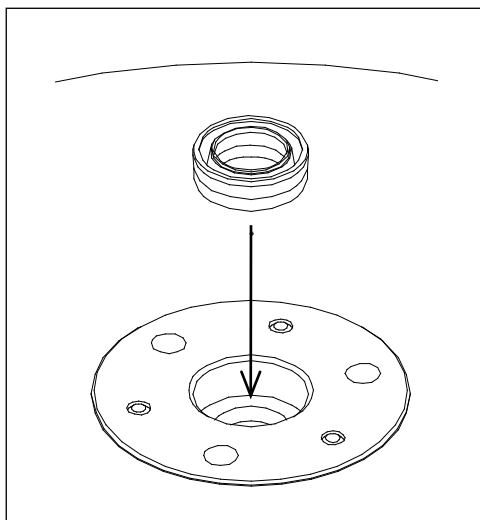
5) With the lip facing up, push the new oil seal fully into the vacuum table insertion part until it stops.

6) Turn the vacuum table over, and attach it to the vacuum stage.

Replacement Cycle 5 years

Standard Working Time 20 minutes

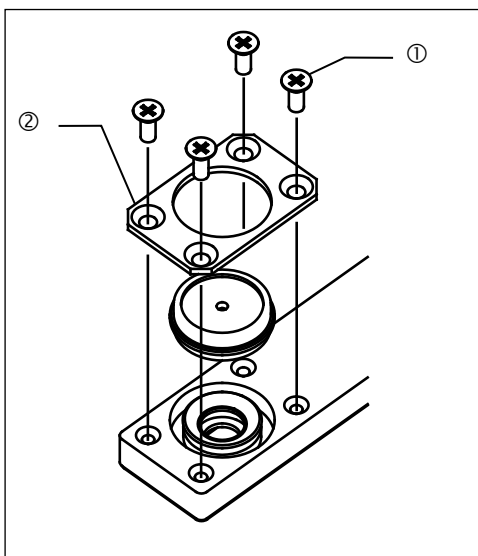## 6 L-arm: If a vacuum error has occurred or the L-arm vacuum pad has become damaged
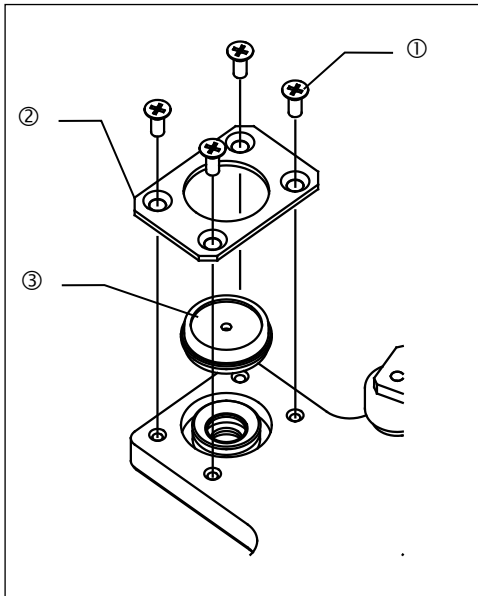
Tools Phillips-head screwdriver (No. 0)

1) Remove the M2 cross recessed pan head machine screws ①
   (four positions for one L-arm vacuum pad).
2) Remove the cover ② of the L-arm vacuum pad.
3) Replace the L-arm vacuum pad ③.
4) Attach the cover ② of the L-arm vacuum pad.

Standard Working Time 15 minutes

7 F-arm: If a vacuum error has occurred or the F-arm vacuum pad has become damaged

Tools Phillips-head screwdriver (No. 0)

1) Remove the M2 cross recessed pan head machine screws ①
   (four positions for one F-arm vacuum pad).
2) Remove the cover ② of the F-arm vacuum pad.
3) Replace the F-arm vacuum pad ③.
4) Attach the cover ② of the F-arm vacuum pad.

Standard Working Time 15 minutes

8 Rubber Microscope Legs: If wafer transfer sound has increased
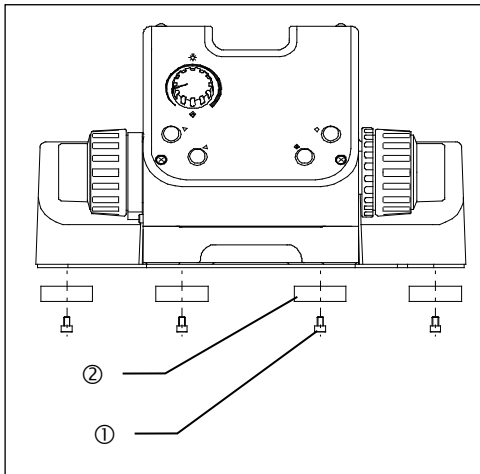
1) Remove the stage and replace the rubber blocks on the underside of the microscope.

Since the wafer transfer position must be checked and other related work must be done, please contact your EVIDENT distributor.

Standard Working Time 60 minutes

Life science solutions	Industrial solutions
Service Center	Service Center
https://www.olympus-lifescience.com/support/service/	https://www.olympus-ims.com/service-and-support/service-centers/
Official website	Official website
https://www.olympus-lifescience.com	https://www.olympus-ims.com

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